Handbook of Operation, Service and Overhaul Instructions with Parts Catalog

STILL CAMERA

(MEDALIST)

PUBLISHED UNDER JOINT AUTHORITY OF THE COMMANDING GENERAL, ARMY AIR FORCES, THE CHIEF OF THE BUREAU OF AERONAUTICS, AND THE AIR COUNCIL OF THE UNITED KINGDOM

NOTICE.—This document contains information affecting the national defense of the United States within the meaning of the Espionage Act, 50 U. S. C., 31 and 32, as amended. Its transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.

1 October 1945

POLICY GOVERNING DISTRIBUTION AND USE OF THIS PUBLICATION

Instructions Applicable to U. S. Navy Personnel:

1. Navy Regulations, Article 76, contains the following statements relating to the handling of restricted matter:

"Paragraph (9) (*a*). Restricted matter may be disclosed to persons of the Military or Naval Establishments in accordance with special instructions issued by the originator or other competent authority, or in the absence of special instructions, as determined by the local administrative head charged with custody of the subject matter."

"(*b*) Restricted matter may be disclosed to persons of discretion in the Government Service when it appears to be in the public interest."

"(*c*) Restricted matter may be disclosed, under special circumstances, to persons not in the Government Service when it appears to be in the public interest."

2. The Bureau of Aeronautics Aviation Circular Letter No. 50-45 contains the following paragraph relative to the use of aeronautical technical publications:

"Paragraph 6. *Distribution to all interested personnel.* In connection with the distribution of aeronautic publications within any activity, it should be borne in mind that technical publications, whether confidential, restricted or unclassified, are issued for use, not only by officer personnel, but also by responsible civilian and enlisted personnel working with or servicing equipment to which the information applies."

3. Disclosure of technical information in this publication may not be made to representatives of foreign governments or nationals except in instances where those foreign governments have been cleared to receive information concerning all equipments, or other technical data covered by this publication.

Instructions Applicable to Army Personnel:

1. This publication is intended for technical aid and education of military and civilian personnel engaged in promoting the war effort. Its maximum distribution and use is therefore encouraged. However, since the publication is "restricted" within the meaning of AR380-5, the following security regulations will be observed:

a. Members of Armed Forces and civilian employees of War Department will be given access to this publication whenever required to assist in the performance of their official duties (including expansion of their knowledge of AAF equipment, procedures, etc.)

b. Personnel of War Department contractors and sub-contractors may be given possession of this publication, on a loan basis, or knowledge of its contents, only when required to assist in the performance of War Department contracts. Releases will be made in accordance with the requirements of T. O. No. 00-5-2.

c. Representatives of other governments will be given possession of this publication, or knowledge of its contents, only in accordance with AAF Letter No. 45-6.

2. This publication is restricted because the information contained in it is restricted. It does not follow that the physical article to which it relates is also restricted. Classification of the materiel or component must be ascertained independently of the classification of this document.

3. Neither this publication nor information contained herein will be communicated to press or public except through Public Relations channels.

Instructions Applicable to British Personnel:

FOR OFFICIAL USE ONLY.—Not to be communicated to anyone outside of his Majesty's service. Not to be published. The information given in this document is not to be communicated, either directly or indirectly, to the press or to any person not holding an official position in his Majesty's service.

LIST OF REVISED PAGES ISSUED

NOTE.—A heavy black vertical line, in the outer margin of revised pages (the left margin for left-hand columns, and the right margin for right-hand columns) indicates the extent of the revision. This line is omitted where more than 50 percent of the page is revised.

BuAer

ADDITIONAL COPIES OF THIS PUBLICATION MAY BE OBTAINED AS FOLLOWS:

AAF ACTIVITIES. In accordance with T. O. No. 00-5-2, base Air Inspectors, Technical will submit requisitions (AAF Form 104B) to:

Commanding General
Fairfield Air Technical Service Command
Patterson Field
Fairfield, Ohio
Attn: Publications Distribution Branch

NAVY ACTIVITIES.—Submit requests to Chief, BuAer, Navy Department, Washington, D. C., Attention: Publications Branch, on order form NAVAER-140. For complete listing of available material and details of distribution see Naval Aeronautic Publications Index, NavAer 00-500.

BRITISH ACTIVITIES.—Submit requirements on Admiralty Form S. 134D to the Naval Store Officer, Royal Navy Store Depot, 191A, Eskew Road, Shepherds Bush, London, W. 12, England.

TABLE OF CONTENTS

Section		Page
I	Introduction	1
II	Description	1
	1. General Description	1
	2. Detailed Description	1
III	Preparation for Use	3
	1. General	3
	2. Putting Camera in Case	3
IV	Operation	3
	1. Principles of Operation	3
	2. Operation Instructions	3
V	Service Inspection, Maintenance, and Lubrication	8
	1. Service Tools Required	8
	2. Service Inspection and Maintenance	8
	3. Lubrication	8
	4. Service Troubles and Remedies	9
VI	Disassembly, Inspection, Repair, and Reassembly	11
	1. Overhaul Tools Required	11
	2. Disassembly	11
	3. Cycle of Operation Without Film	27
	4. Inspection	28
	5. Repair	28
	6. Reassembly	38
VII	Parts Catalog Introduction	51
VIII	Group Assembly Parts List	53
IX	Numerical Parts List	77

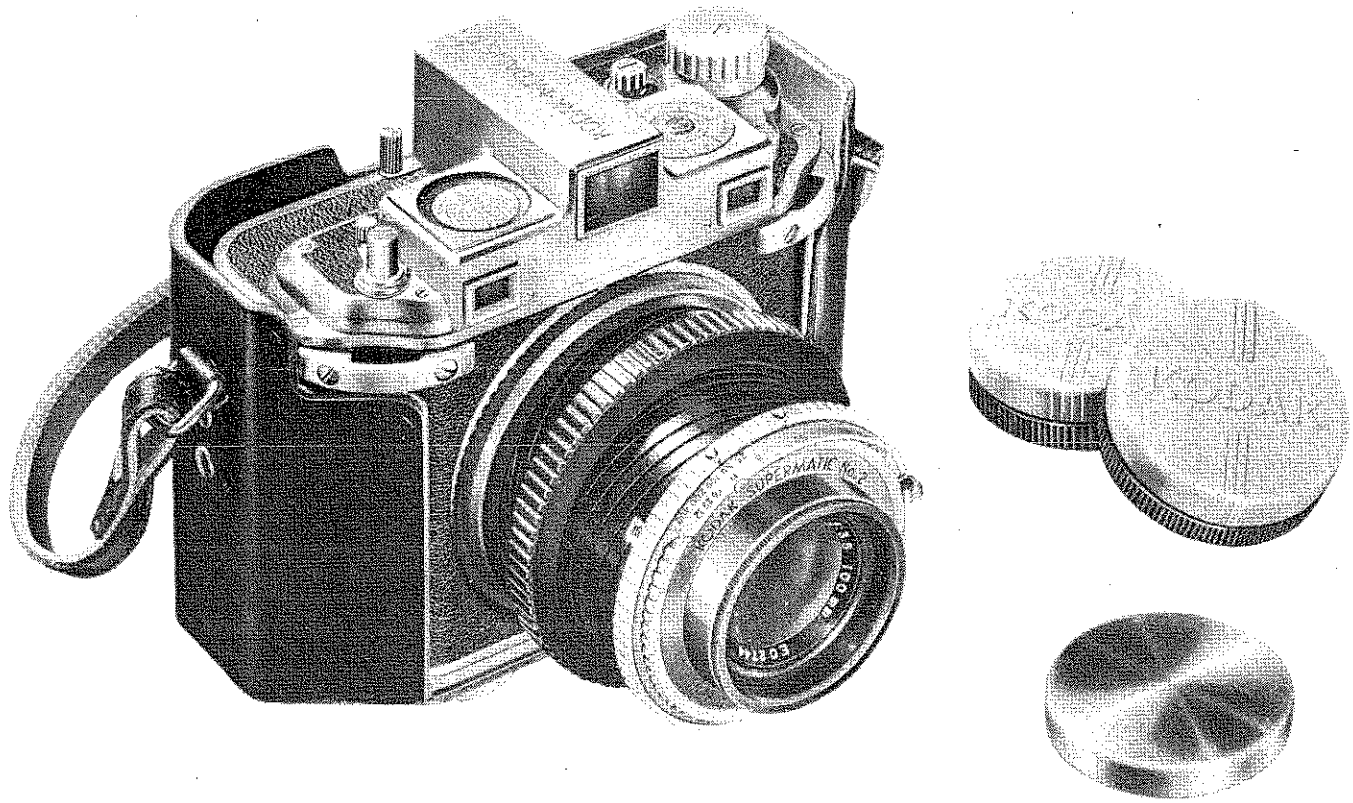
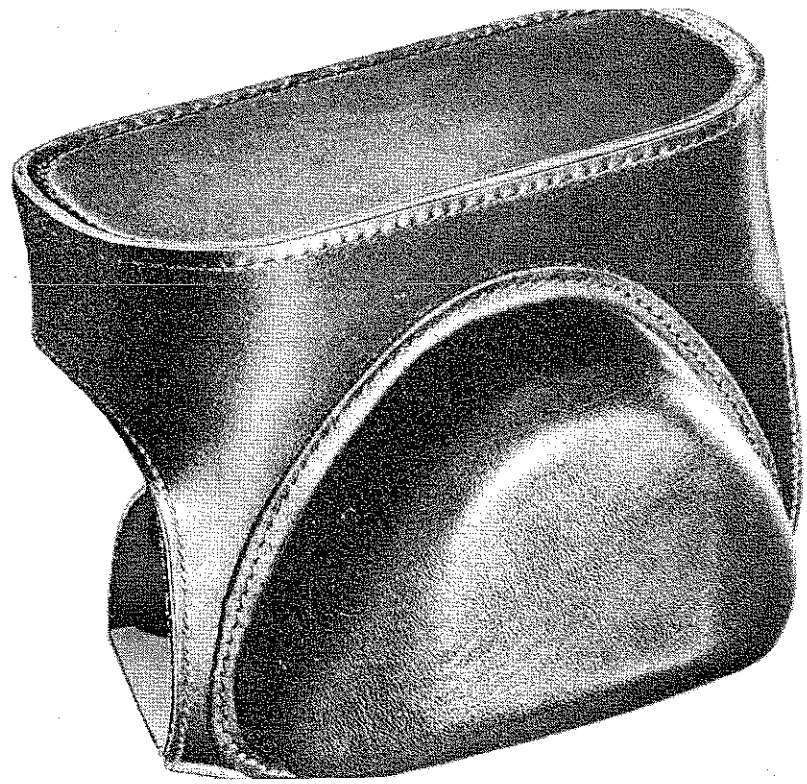


Figure 1—Kodak Medalist



SECTION I
INTRODUCTION

1. This Handbook contains descriptive data on and instructions for the Operation, Maintenance, and Service of the roll film camera, Kodak Medalist, U. S. Navy Stock No. 18-C-315-25, manufactured by the Eastman Kodak Company, Rochester 4, N. Y.

SECTION II
DESCRIPTION

1. GENERAL DESCRIPTION.

a. The Kodak Medalist (figure 1) makes eight 2¼ x 3¼-inch negatives on No. 620 roll film. The winding key knob is coupled with a measuring device which locates each frame of film correctly.

b. The camera is equipped with an *f*/3.5 Kodak Ektar Lens with a focal length of 100 mm.

c. The shutter is a Kodak Supermatic No. 2 which is specially adapted for this camera. Since the shutter is automatically set as the film is advanced, accidental double exposures are prevented.

d. The lens and shutter are mounted in a metal helical gear focusing tube.

e. The camera is provided with a coupled range finder and a view finder which is corrected automatically for parallax.

f. The diaphragm and shutter speed controls, as well as the lens opening and shutter speed scales, are located on top of the camera.

g. The camera measures 5½ x 4½ x 3¾ inches over all and weighs 3¼ pounds.

h. A leather carrying case and two filters, the Wratten No. 12 (Minus Blue) and No. 25 (A), are included with each camera.

i. Three types of Kodak Medalist, designated as types A, B, and C, are in use by the Navy. Refer to section VI, paragraph 2.a.

2. DETAILED DESCRIPTION.

a. LENS. (See figure 2.)

(1) The 100-mm *f*/3.5 Kodak Ektar Lens is fully color-corrected. It covers an angle of view of 32° x 45° when focused at infinity.

(2) All inner air-glass surfaces are coated to reduce internal reflections and to increase light transmission.

(3) The lens is marked for the following openings: *f*/3.5, *f*/4, *f*/5.6, *f*/8, *f*/11, *f*/16, *f*/22, and *f*/32.

(4) The inside of the lens mount is threaded and is supplied with an insert (5) which retains a filter directly in the mount.

(5) A lens cap (figure 1) is provided for protecting the lens when the camera is not in use.

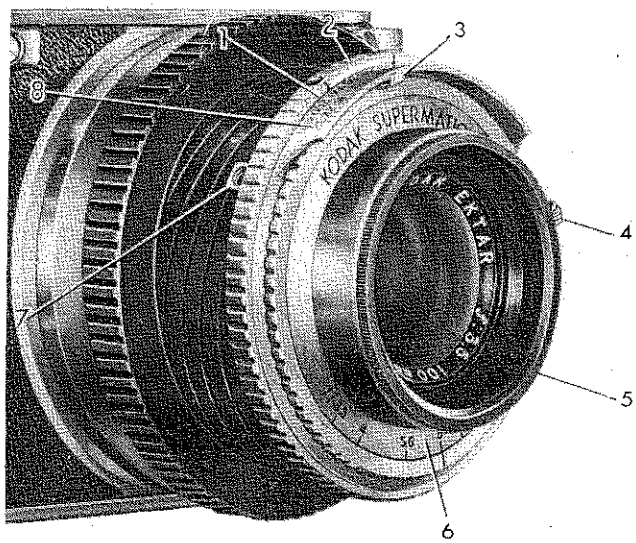


Figure 2—Lens and Shutter

Index No.	Nomenclature
1	Shutter speed scale
2	Speed control ring
3	Diaphragm pointer
4	Delayed action winding lever
5	Adapter ring insert
6	Lens opening scale
7	Cable release socket
8	Lens opening scale

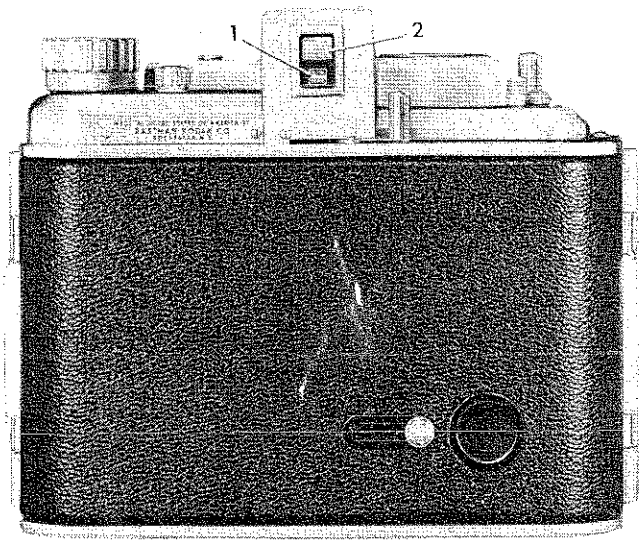


Figure 3—Kodak Medalist, Rear View

Index No.	Nomenclature
1	Range finder
2	View finder

b. SHUTTER. (See figure 2.)

(1) The Kodak Supermatic Shutter is of the gear-train retard, presetting type. It has a built-in delayed exposure mechanism and a cable release socket (7) for remote control and flash synchronization.

(2) The shutter is marked for the following speeds: 1, ½, 1/5, 1/10, 1/25, 1/50, 1/100, 1/200, and 1/400 second, as well as bulb. Time exposures are made with a special locking lever on the trigger button.

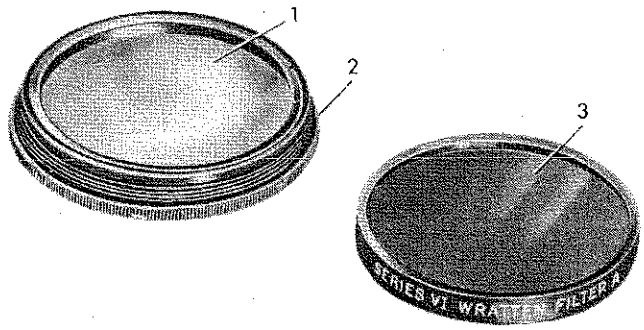


Figure 4—Filters and Insert

Index No.	Nomenclature
1	Wratten No. 12 (Minus Blue) Filter
2	Adapter ring insert
3	Wratten No. 25 (A) Filter

c. CAMERA BODY.—The camera body is composed entirely of interlocking, light-trapped die-castings.

d. RANGE FINDER.—The range finder is of the split-field coincidence type, coupled to operate automatically with the lens. The base of the range finder is 2½ inches, the magnification 1.5×. A focusing scale, indexed for visible and infrared light and combined with a depth-of-field scale, is mounted on top of the camera.

e. VIEW FINDER.—The view finder is of the direct type, fully enclosed. Since it is centered over the lens, there is no horizontal parallax. Vertical parallax is automatically compensated for by a correcting frame in the view finder which is coupled with the lens. The rear elements of both range and view finder systems

Figure 5—Carrying Case

are brought together in a twin eyepiece (figure 3). A shift in the angle of vision—without moving the camera—shows both fields.

f. FILTERS. (See figure 4.)—Two cemented Wratten Filters, a No. 12 (Minus Blue) and a No. 25 (A), are supplied in individual plastic cases. Either filter can be mounted in the lens mount with the insert ring.

g. CARRYING CASE. (See figure 5.)—A leather "field-type" carrying case, with adjustable neck strap, is supplied with the camera. It is so designed that the camera can be operated while in the case. A retaining screw holds the camera so that it cannot fall out when the case front is dropped for operation.

SECTION III
PREPARATION FOR USE

1. GENERAL.—Examine the outer lens surface and the range and view finder windows for dust and fingermarks. If necessary, clean them with lens cleaning paper or a soft, lintless cloth. Refer to section V, paragraph 2.a. and b.

2. PUTTING CAMERA IN CASE.

a. Fasten the ends of the neck strap to the links on the carrying case.

b. Unfasten the back flap of the case cover and open the case. Slip the camera into the case and screw the retaining screw into the tripod socket of the camera as shown in figure 6. The retaining screw is provided with a standard tripod socket so that the camera can be used on a tripod while in the case.

c. If desired, the neck strap can be fastened directly on the camera. Brackets are provided on both sides of the camera front to accommodate the strap.

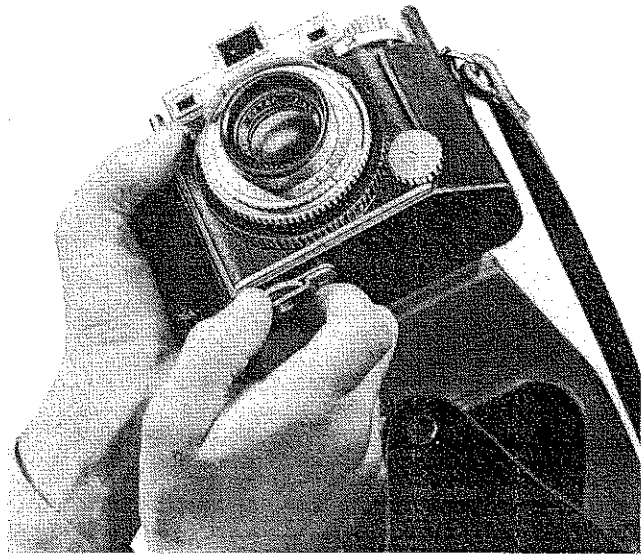


Figure 6—Putting Camera in Carrying Case

SECTION IV
OPERATION

1. PRINCIPLES OF OPERATION.—The basic principles of operation of the Kodak Medalist are similar to those which apply to any camera. Certain features of its design, however, differ from those commonly employed in camera manufacture. Instead of the bed and bellows of the conventional larger-negative camera, the Kodak Medalist has two helically interthreaded metal tubes which support the lens and shutter. The lens is extended and retracted as a complete unit, without turning, and with exact coincidence of focal and film planes maintained at every position. The shutter is coupled by a single arm to the controls on the body of the camera.

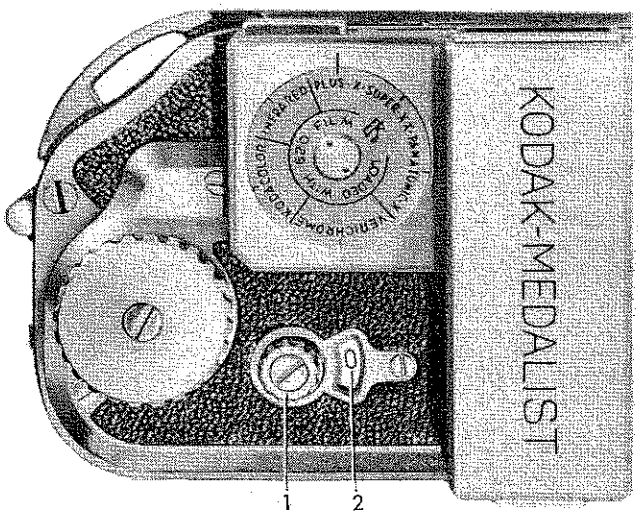


Figure 7—Counter Knob and Counter Dial

Index No.	Nomenclature
1	Counter knob
2	Counter dial

2. OPERATION INSTRUCTIONS.

a. LOADING.—The camera can be loaded in daylight but not in direct sunlight or exceptionally strong artificial light. Use No. 620 roll film.

(1) Before loading the camera, look at the exposure counter dial (2, figure 7), to see if "0" is in the forward half of the window; if it is, proceed with the loading as described below. If any figure but "0" shows in the forward half of the counter window, depress and turn the counter knob (1, figure 7) until "0" appears in the forward part of the window.

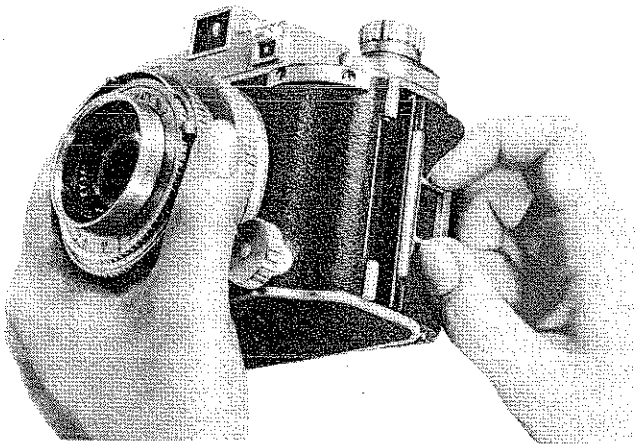


Figure 8—Opening Camera Back

NOTE

Under normal conditions, "0" should be in the forward half of the exposure counter window as described above. However, if the previous roll of film was removed from the camera before it had been wound off completely, it is necessary to set the exposure counter to "8" instead of "0."

(2) The back of the camera is hinged at both ends; it can be opened at either end or removed entirely. To open the back, press the two hinge grips toward one another and swing the back outward as shown in figure 8.

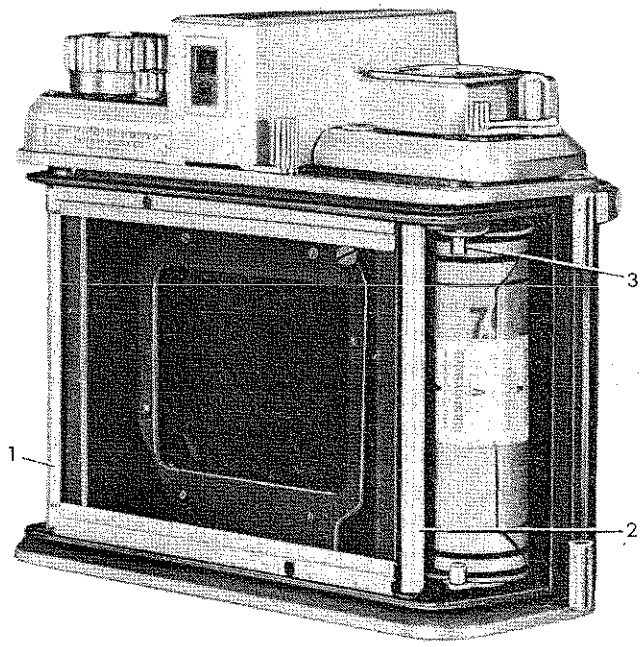


Figure 9—Inserting Roll of Film

Index No.	Nomenclature
1	Safety control driving shaft assembly
2	Film roller
3	Spool roller

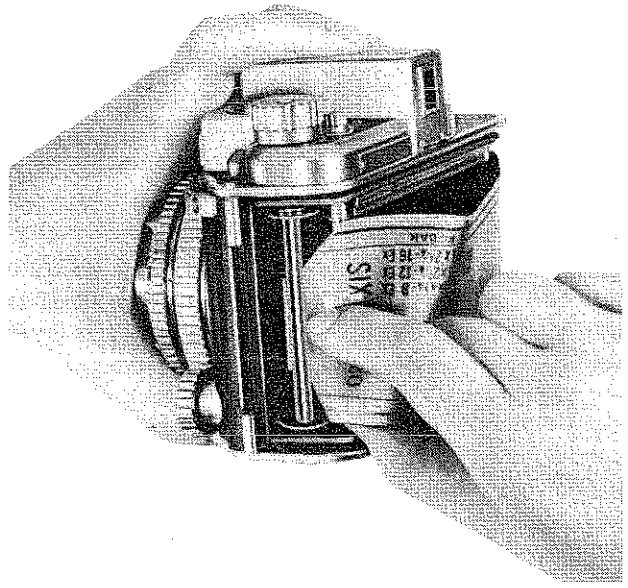


Figure 10—Threading Film

(3) Insert the roll of film in the recess which has a spring bracket, with the spool resting under the two projections on the sides of the bracket (figure 9).

(4) Break the seal and pass the protective paper over the spool rollers (3, figure 9), the film roller (2, figure 9), and the safety control driving shaft assembly (1, figure 9). Thread the end of the paper into the longer slit in the empty spool as far as it will go. (See figure 10.)

CAUTION

Never turn the safety control driving shaft assembly manually or the camera may jam. Refer to section VI, paragraph 3.a.

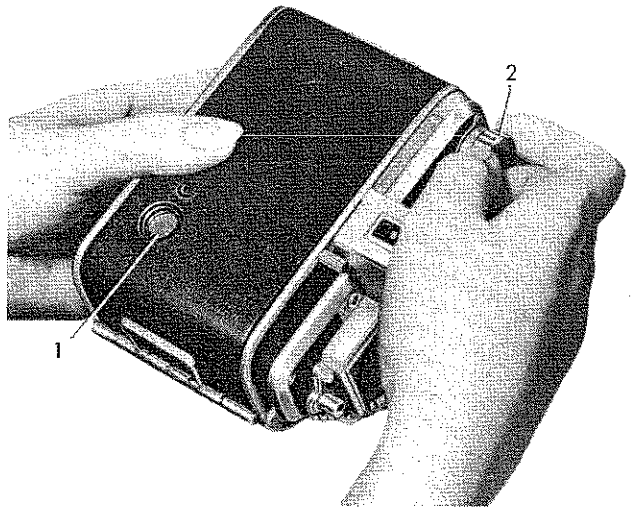


Figure 11—Winding Film

Index No.	Nomenclature
1	Film window
2	Winding key knob

(5) Turn the winding key knob (2, figure 11) once or twice to bind the paper on the spool. Be sure the paper is started straight. Close the back with a firm pressure until the hinge grips snap outward into place.

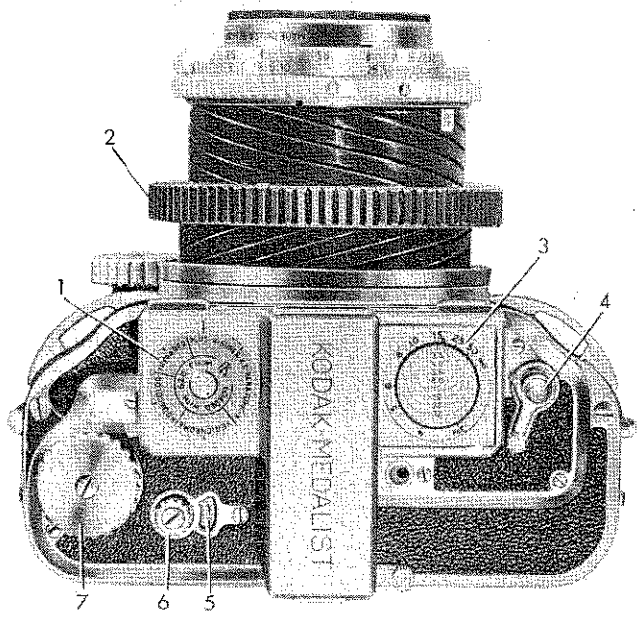


Figure 12—Kodak Medalist, Top View

Index No.	Nomenclature	Index No.	Nomenclature
1	Film indicator dial	5	Counter dial
2	Focusing collar	6	Counter knob
3	Focusing scale	7	Winding key knob
4	Trigger button		

b. WINDING THE FIRST SECTION OF FILM INTO PLACE.

(1) Draw back the slide which covers the red film window (1, figure 11) on the back of the camera. This is a spring slide and must be held while the winding key knob (2, figure 11) is turned. Turn until a small hand appears in the film window. Continue turning slowly until the figure "1" appears at the edge of the window. Depress the counter knob (6, figure 12) and turn the counter dial (5, figure 12) until the figure "1" appears in the forward part of the window. Then give a slight turn to the winding key knob until it locks. The figure "1" on the protective paper will now show in the film window.

(2) If the film is inserted in the camera and the winding knob turned with the exposure counter on some figure other than "0", the winding mechanism will lock. The counter knob must then be depressed and turned until "8" appears in the forward half of the window. To release the winding mechanism the lens must be brought to picture-taking position (refer to paragraph 2.c., this section) and the trigger button (4, figure 12) pressed. Then proceed with winding the film as described above.

(3) The film indicator dial (1, figure 12) on the top of the camera should be set to show the kind of film with which the camera is loaded.

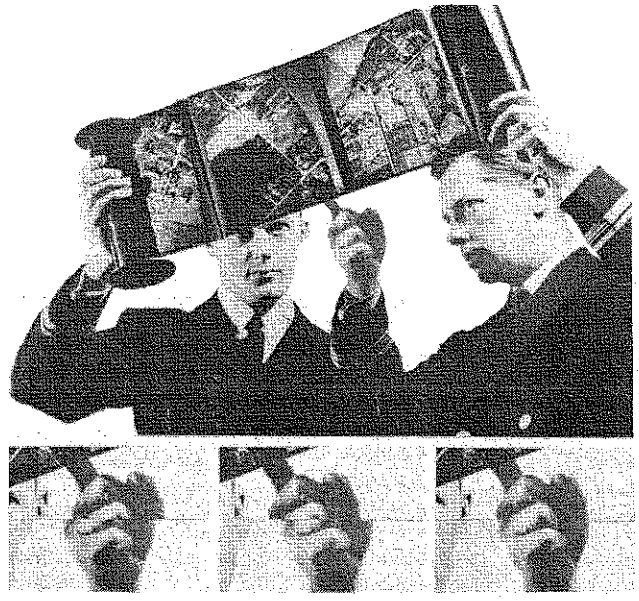
c. BRINGING THE LENS TO PICTURE-TAKING POSITION. (See figure 12.)—Turn the large focusing collar (2) on the focusing tube to bring the lens to a picture-taking position. This can be judged by the focusing scale (3) on the top of the camera. As the lens is brought forward, this scale automatically revolves and when ∞ (Infinity) comes to the index (and not before) the trigger button (4) can be depressed.

CAUTION

The camera may be damaged if force is used to depress the trigger button before the lens is brought to the infinity position.

d. FOCUSING.—The camera can be focused with the range finder or, if desired, by estimating the distance and positioning the lens through reference to the focusing scale.

(1) The range finder eyepiece is directly below the view finder (figure 3). Look through the eyepiece. It will be noted that a distinct horizontal line cuts the field of view into two equal parts. Select as a target a vertical line in that portion of the subject which must be sharpest in the picture. The line will appear broken. (See figure 13.) Turn the focusing collar until



AS THE IMAGE WILL APPEAR WHEN THE RANGE FINDER IS SET FOR A DISTANCE SHORTER THAN THE CORRECT ONE

AS THE IMAGE WILL APPEAR WHEN THE RANGE FINDER IS SET FOR A DISTANCE LONGER THAN THE CORRECT ONE

AS THE IMAGE WILL APPEAR WHEN THE RANGE FINDER IS SET FOR THE CORRECT DISTANCE

Figure 13—Setting Range Finder

the line is unbroken. The lens will now be focused and the focusing scale will indicate the camera-to-subject distance.

NOTE

If infrared film is used, determine the camera-to-subject distance with the range finder, then move the focusing collar to bring the figure representing the distance for which the lens is focused to the *red dot* (2, figure 14) on the focusing scale. This is necessary because infrared rays come to a focus slightly behind the focus of visual rays.

(2) Under some conditions, it may be desirable to estimate distance and focus the lens through reference to the focusing scale. This method is seldom used unless the subject is 10 or more feet away from the camera, since at the shorter distances the depth of field is relatively restricted. Estimate the distance and then turn the focusing collar until the figure representing the camera-to-subject distance is at the index mark (1, figure 14) of the focusing scale.

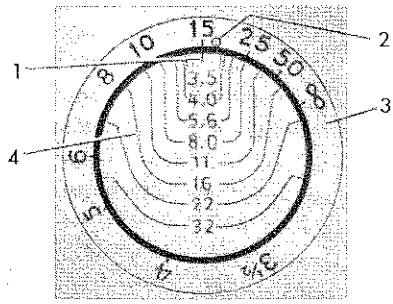


Figure 14—Depth-of-Field Scale

Index No.	Nomenclature
1	Index mark
2	Red dot (for infrared focusing)
3	Focusing scale
4	Depth-of-field scale

(3) The depth-of-field scale (4, figure 14) tells at a glance the depth that will be obtained at the distance focused on. To find the depth of field for a given distance and lens opening, read the distances on the outside ring at the lines coming from the chosen *f*/ number on the circular scale. For example: If the camera is focused for 15 feet and *f*/5.6 is used, everything from about 11 feet to about 20 feet will be sharp; with *f*/11, everything from about 9½ feet to 35 feet will be sharp. (See figure 14.)

NOTE

Since the focusing scale extends just to 3½ feet, only the depth of field to the rear is indicated when the camera is focused for 3½ feet. For 3½ feet, the depth with *f*/3.5 is 3 feet 4 inches to 3 feet 8 inches; with *f*/5.6, 3 feet 3 inches to 3 feet 10 inches.

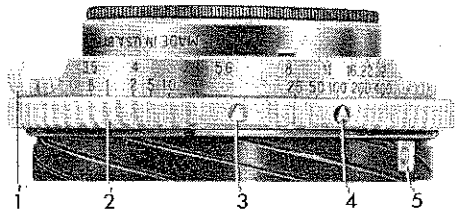


Figure 15—Setting Shutter Speed

Index No.	Nomenclature
1	Delayed action winding lever
2	Speed control ring
3	Red pointer
4	Black pointer
5	Cable release socket

e. SHUTTER SPEEDS.

(1) To adjust the shutter for a speed of 1/25 second or faster, turn the knurled speed control ring (2, figure 15) until the black pointer (4, figure 15) is at the shutter speed desired.

(2) For a speed slower than 1/25 second, turn the speed control ring until the red pointer (3, figure 15) is at the speed desired.

(3) For bulb exposures, move the red pointer to the letter "B." Press the trigger button; the shutter will remain open as long as the button is held down.

(4) For time exposures, move the red pointer to "B" and swing the time lever (2, figure 16) forward as far as it will go. When the trigger button is pressed down, the shutter will open and remain open until the time lever is swung back to its normal position.

(5) To use the delayed action release, place the

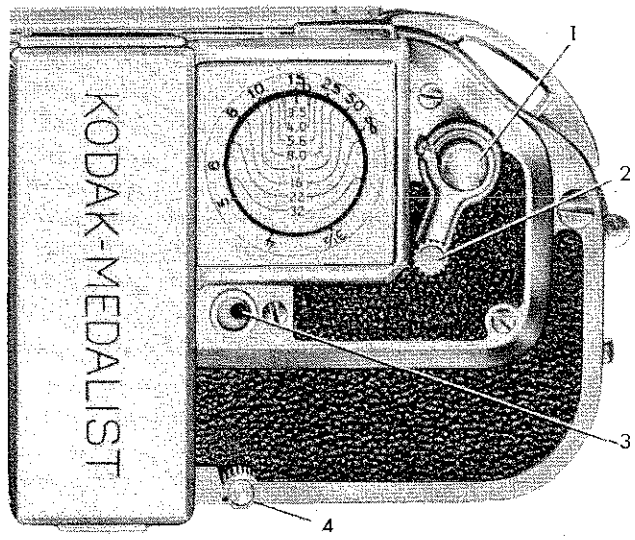


Figure 16—Shutter Controls

Index No.	Nomenclature
1	Trigger button
2	Time lever
3	Red signal
4	Shutter setting lever

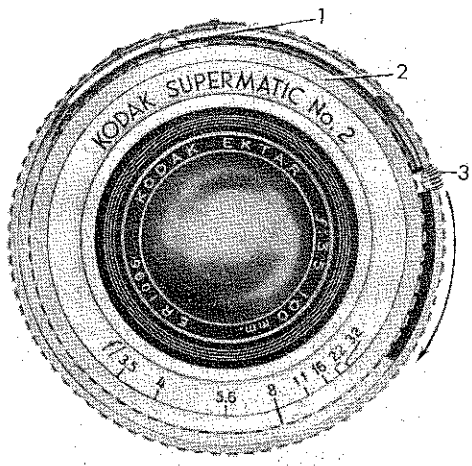


Figure 17—Lens Opening and Delayed Action Controls

Index No.	Nomenclature
1	Diaphragm pointer
2	Diaphragm control ring
3	Delayed action winding lever

camera on a tripod or other support and set the shutter for the proper speed and lens opening. Push the delayed action winding lever (3, figure 17) down as far as it will go. Press the trigger button AS FAR AS IT WILL GO. After about 10 seconds the exposure will be made.

CAUTION

Do not attempt to use the delayed action release for bulb exposures.

f. LENS OPENINGS.—The lens openings are adjusted with the diaphragm pointer (1, figure 17) on the diaphragm control ring (2, figure 17).

Figure 18—Operating Position

g. VIEW FINDER.—The view finder eyepiece is located directly above that of the range finder. (See figure 3.) Hold the camera so that the entire front frame of the finder is seen through the eyepiece.

h. RELEASING THE SHUTTER.—Normally the shutter is set when the film is wound; however, after the first section of film is brought into position, it is advisable to push the shutter setting lever (4, figure 16) toward the center of the camera as far as it will go and then release it. Bring the lens to the picture-taking position and press the trigger button to make the exposure. The operating position of the camera is shown in figure 18. It will be unnecessary to set the shutter manually for the other exposures.

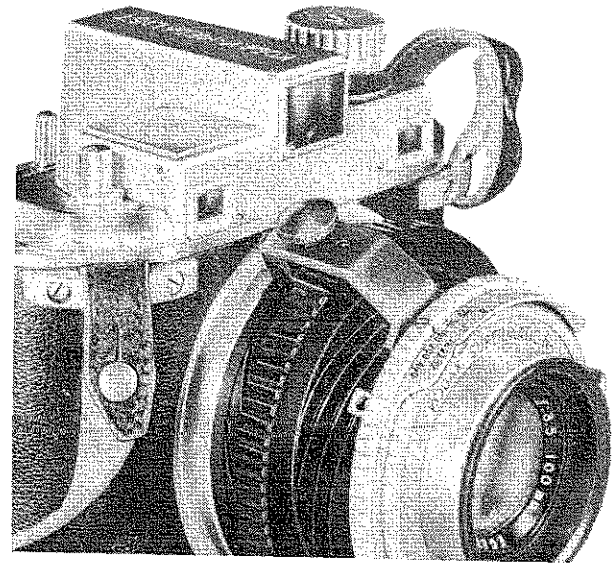


Figure 19—Infinity Stop in Position

(1) The red signal (3, figure 16) located directly behind the focusing scale is a warning that a new section of film must be brought into position. As a new section of film is brought into place, the red signal disappears. It reappears after the exposure is made.

(2) After an exposure is made, the winding key knob is released. Turn the knob until it locks; this sets the shutter and moves the succeeding exposure number to the forward half of the exposure counter window.

i. DOUBLE EXPOSURES.—When a double exposure is wanted, make the first exposure and then push the shutter setting lever (4, figure 16) toward the center of the camera as far as it will go. Release the lever, permitting it to return to its original position, and again push the trigger button.

j. USING A CABLE RELEASE.—A T.B.I. Cable Release No. 2 can be used with the Kodak Medalist. To attach the cable release to the camera, screw it into the cable release socket (5, figure 15) directly behind the shutter speed control ring. After the

shutter has been tripped with a cable release, the trigger button must be depressed in order to free the winding mechanism.

k. USING AN INFINITY STOP.—The infinity stop, available as an accessory for the Kodak Medalist, holds the focusing tube rigidly in the infinity position. To attach the infinity stop to the camera, extend the focusing tube as far as possible. Place the stop over the focusing tube with the tongue under the focusing collar as shown in figure 19. Retract the focusing tube to the infinity position and tighten the knurled screw.

l. REMOVING FILM.

(1) After the last picture has been made, turn the winding key knob until the end of the paper on the roll passes the red window.

(2) In subdued light, open the back of the camera. Hold the end of the paper taut and turn the knob until all of the paper is on the roll.

(3) Take hold of the end of the paper and sticker as shown in figure 20, and remove the film. Fold the end of the paper under and fasten it with the sticker.

CAUTION

After removing the film, do not wind it tightly with a twisting motion, because this may scratch the film.

(4) Remove the empty spool and place it in the winding end of the camera, fitting the key turned by the knob into the slot in the end of the spool.

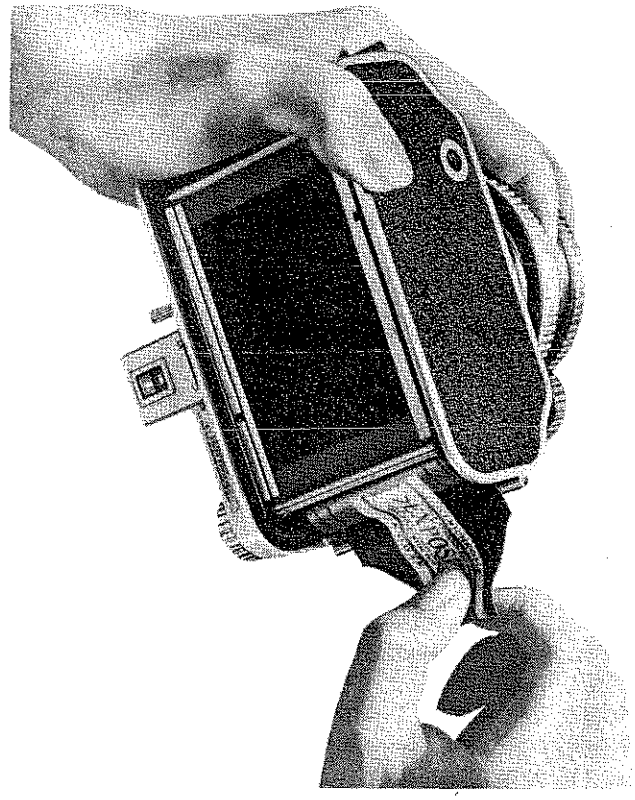


Figure 20—Removing Film

SECTION V
SERVICE INSPECTION, MAINTENANCE, AND LUBRICATION

1. SERVICE TOOLS REQUIRED.—No special service tools are required.

2. SERVICE INSPECTION AND MAINTENANCE.

a. CLEANING LENS.—If an outer surface of the lens requires cleaning, first brush away any grit or dust. Then wipe the surface gently with lens cleaning paper or a soft, lintless cloth, using lens cleaner or moisture from the breath as required.

CAUTION

To reduce internal reflections and increase light transmission, special coatings have been applied to the inner air-glass surfaces of the lens. These surfaces rarely require cleaning. However, if it is necessary to clean them, extreme care must be exercised because the coatings are considerably softer than glass. Blowing off the dust with an air syringe is recommended. If a syringe is not available, use a soft camel's-hair brush or a clean, soft, lintless cloth and brush the surface very gently, making no attempt to wipe it.

b. CLEANING RANGE AND VIEW FINDER WINDOWS.—The range and view finder windows can be cleaned in the same manner as an outer surface of the lens.

c. CLEANING INSIDE OF CAMERA.—At regular intervals blow dust out of the camera with a blast of air or clean out dust with a camel's-hair brush or a soft, lintless cloth. This procedure will prevent dust from settling on the film and causing spots or scratches.

d. CHECKING RANGE FINDER.—Occasionally check the range finder on an accurately measured distance of 15 feet. If it is seriously out of adjustment, refer to section VI, paragraph 6.n., o., and p.

3. LUBRICATION.—No lubrication is required.

4. SERVICE TROUBLES AND REMEDIES.

TROUBLE	PROBABLE CAUSE	REMEDY
CAMERA IS JAMMED	The safety control driving shaft assembly (1, figure 22) has been turned manually without first turning the winding key knob (the camera usually jams on the third or fourth cycle). See section VI, paragraph 3.a.	Set the counter dial on "1." Rack the focusing tube assembly all the way in. Press the trigger button down as far as possible and hold it down while turning the winding key knob until a definite click is heard. In severe cases it may appear that the trigger button cannot be depressed at all; however, by alternately pushing hard on the trigger button and turning the knob with strong finger pressure, it is usually possible to work the knob free. Rack the focusing tube assembly out at least to the infinity position and press the trigger button. The camera jam should be cleared.
	The winding key knob has been turned with the trigger button partly depressed.	Same as above.
	On cameras of type A (refer to section VI, paragraph 2.a.), binding of the shutter operating disc assembly (7, figure 21) has allowed the back end of the shutter operating lever (5, figure 21) to hang over toward the trigger plate (7, figure 22). As a result, the trigger plate has moved over the top of the lever instead of tripping the shutter. On cameras of types B and C, the same trouble can occur with the shutter operating disc (15, figure 21) and the shutter operating lever and end assembly (13, figure 21).	Remove the shutter (refer to section VI, paragraph 2.j.) and make sure the shutter light guard (2, figure 30) is not bent or rough. Clean the shutter operating disc and the shutter operating disc spacer (1, figure 39) and work them together with powdered graphite. Remove all excess graphite before reassembly.
	On cameras of types A and B (refer to section VI, paragraph 2.a.), the tension on the shutter operating lever spring (3, figure 21) is too low and the back end of the shutter operating lever (5, figure 21) or the shutter operating lever and end assembly (13, figure 21) has been allowed to hang over toward the trigger plate (7, figure 22). As a result, the trigger plate has moved over the top of the lever instead of tripping the shutter. On cameras of type C, the same trouble can occur with the guide lug spring (19, figure 21).	On cameras of types A and B, increase the tension on the shutter operating lever spring by releasing the long end of the spring and pulling it around counterclockwise toward the back of the camera. Do not, however, put excessive tension on the spring. On cameras of type C, increase the tension on the guide lug spring by removing two or three turns of the spring.
	The trigger lock spring (13, figure 28) has slipped under the end of the safety lever assembly (2, figure 28) and the safety lever assembly has not unlocked the trigger button.	Disassemble the camera down to the mechanism plate and adjust the safety lever assembly. Refer to section VI, paragraph 5.h.(5).
WINDING KEY KNOB DOES NOT UNLOCK WHEN SHUTTER IS RELEASED	The shutter is releasing before the winding mechanism (camera is out of synchronization).	Refer to section VI, paragraph 5.f.
BLANK FRAME OF FILM	The winding mechanism is releasing before the shutter (camera is out of synchronization).	Refer to section VI, paragraph 5.f.
WINDING KEY KNOB DOES NOT LOCK WITH COUNTER DIAL ON A NUMBER OTHER THAN "0"	The safety lever spring (1, figure 28) is weak or broken.	Disassemble the camera down to the mechanism plate and replace the safety lever spring.

TROUBLE	PROBABLE CAUSE	REMEDY
SHUTTER TRIPS WHEN SHUTTER SETTING LEVER IS RELEASED	On cameras of types A and B (refer to section VI, paragraph 2.a.), the tension on the shutter operating lever spring (3, figure 21) is too high. On cameras of type C the tension on the guide lug spring (19, figure 21) is too high.	On cameras of types A and B, decrease the tension on the shutter operating lever spring by pulling the long end of the spring over toward the winding key knob. On cameras of type C, stretch the guide lug spring slightly.
FILM WINDS TOO HARD	The key complete (9, figure 25) is binding on the counter dial housing complete (4, figure 25). The spool holder assembly (11, figure 31) is binding on the case.	Loosen the three screws (3, figure 25) holding the counter dial housing in place and shift the housing until the key post is centered in the hole in the housing. Bend the roller ends of the spool holder assembly until they do not touch the case when a roll of film is inserted in the spool housing.
SHUTTER IS NOT SET WHEN WINDING KEY KNOB IS TURNED WITH COUNTER DIAL ON A NUMBER OTHER THAN "0"	The shutter setting gear stop lever (4, figure 28) is not releasing the shutter setting gear assembly (25, figure 28).	Disassemble the camera down to the mechanism plate and swedge the shutter setting gear stop lever at the point where it makes contact with the second stud on the safety lever assembly (2, figure 28).
TRIGGER BUTTON FAILS TO SNAP BACK TO ITS PROPER POSITION AFTER TRIPPING SHUTTER, OR RETURNS TOO SLOWLY	The trigger button is binding on the time lever housing complete (3, figure 24). The tension on the trigger plate spring (12, figure 28) is too low.	Loosen the three screws (1, figure 24) holding the time lever housing in place, and shift the housing until the trigger button is centered in the hole in the housing. If necessary, remove the housing and clean and smooth the hole. Remove the direct view finder cover assembly and time lever housing complete, and add tension to the trigger plate spring by removing one loop. Care should be taken in this adjustment because if too much tension is added to the spring, the trigger plate (7, figure 22) may not lie flat against the under side of the mechanism plate. As a result, the shutter operating lever (5, figure 21) on cameras of type A (refer to section VI, paragraph 2.a.) or the right shutter operating lever lug (11, figure 21) on cameras of type B or right shutter operating lever lug assembly (18, figure 21) on cameras of type C may bear up against the trigger plate when the shutter is cocked with the focusing tube assembly extended to the 3½-foot position.
TRIGGER BUTTON DOES NOT LOCK AFTER AN EXPOSURE IS MADE	The trigger lock spring (13, figure 28) has slipped over the end of the safety lever assembly (2, figure 28) and is being held up out of position by the trigger button sleeve.	Disassemble the camera down to the mechanism plate and adjust the safety lever assembly. Refer to section VI, paragraph 5.h.(5).
SHUTTER BLADES OPEN AND CLOSE AS SHUTTER IS BEING SET	The left shutter operating lever lug (9, figure 21) has slipped out of position, causing partial shutter setting action.	Loosen the screws holding the left shutter operating lever lug and move the lug slightly to the left. Care should be taken not to move it over so far that it will make the winding key knob turn too hard as the shutter is being set. After securing the proper adjustment, tighten the screws and shellac the heads to prevent them from working loose.
FOCUSING TUBE BINDS	The upper guide rod (5, figure 22), one end of which is eccentric, has been turned.	Turn the upper guide rod by means of the screw driver slot at the back end of the rod until the focusing tube operates more smoothly. Refer to section VI, paragraph 6.g.(4).
FOCUSING TUBE WORKS TOO FREELY	The upper guide rod (5, figure 22) has been turned.	Turn the upper guide rod by means of the screw driver slot at the back end of the rod until the focusing tube does not operate so easily. Refer to section VI, paragraph 6.g.(4).

TROUBLE	PROBABLE CAUSE	REMEDY
SPACING BETWEEN EXPOSURES IS TOO GREAT OR TOO SMALL	The winding key knob has been forced and the prongs on the left end of the safety lever assembly (2, figure 28) are bent.	Disassemble the camera down to the mechanism plate and adjust or replace the safety lever assembly. Refer to section VI, paragraph 5.h.
RANGE FINDER IS OUT OF ADJUSTMENT	If the focusing scale does not read correctly, refer to section VI, paragraph 6.n., o., and p. If the range finder is out of adjustment optically, refer to section VI, paragraph 5.i.	If the focusing scale does not read correctly, refer to section VI, paragraph 6.n., o., and p. If the range finder is out of adjustment optically, refer to section VI, paragraph 5.i.
SHUTTER IS NOT WORKING PROPERLY	Refer to section VI, paragraph 5.a.	Refer to section VI, paragraph 5.a.

SECTION VI

DISASSEMBLY, INSPECTION, REPAIR, AND REASSEMBLY

1. OVERHAUL TOOLS REQUIRED.

Part No.	Nomenclature	Application
84	Handle	For special tool No. 501-U
501-A	Shutter retaining collar wrench	For removing shutter from camera
501-B	Focusing tube retaining collar wrench	For removing focusing tube assembly from camera case
501-C	Offset screw driver	For adjusting range finder prisms
501-D	Wrench	For focusing range finder objective lenses
501-E	Wrench	For adjusting range finder prisms
501-I	Bending tool	For bending trigger plate or trigger bell crank
501-L	Offset screw driver	For various screws
501-O	Clamp	For removing front lens and mount from shutter
501-U	Expanding tool	For removing lens adapter. (Used with Handle No. 84 on cameras of type A only. Refer to paragraph 2.a., this section.)
501-V	Ground glass and spring clamp	For focusing
501-W	Shutter protector block	For use in protecting shutter and lens when they are removed from the camera

2. DISASSEMBLY.

NOTE

If the repairs to be made involve only the shutter, the shutter complete (1, figure 30) can be removed from the camera without disassembling the camera. Refer to paragraph 2.j., this section.

a. CLASSIFICATION OF CAMERA TYPES.—The cameras covered by these instructions differ in certain details, principally in the shutter operating mechanism. In general, the cameras can be classified into three types, illustrated in figure 21. In the following text, references to types A, B, and C will be understood to refer to the three types shown in the illustration.

b. RANGE FINDER ACTUATING LEVER LINK. (See figure 22.)—The range finder actuating lever link (10) is located inside the camera. The end of the link toward the back of the camera is slotted and slides forward and back as the focusing tube assembly is moved in and out.

NOTE

It is not necessary to remove the range finder actuating lever link unless the range finder plate is to be removed.

(1) Remove the camera back and extend the focusing tube assembly out to the limit of travel.

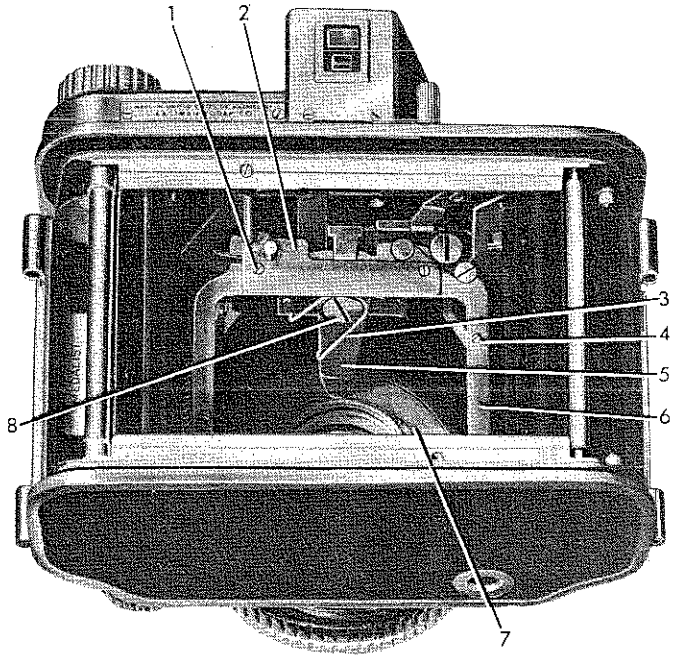
(2) Insert the blade of a jeweler's screw driver in the key slot of the link, and pull the link back to disengage and remove it.

(3) Retract the focusing tube assembly to the closed position.

c. DEPTH-OF-FOCUS SCALE. (See figure 23.)

(1) Loosen the two depth-of-focus scale frame to cover screws (6).

(2) Pry up the focusing scale frame (1) and the

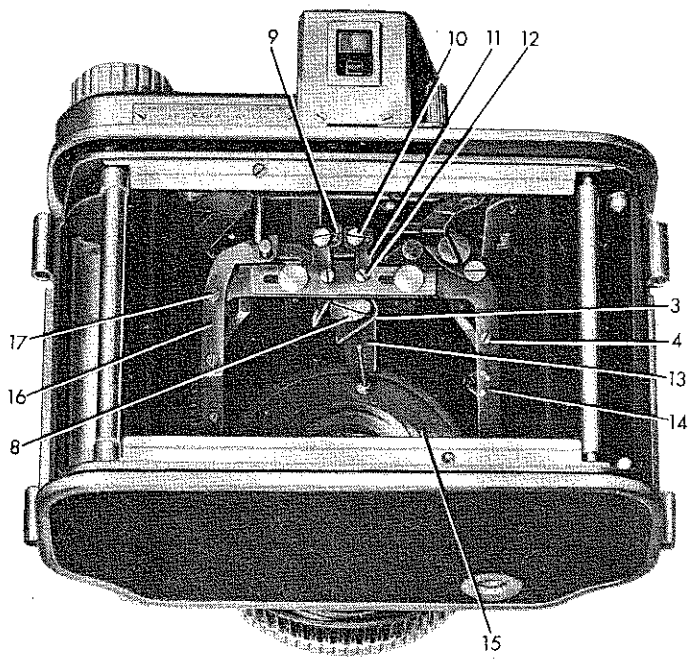


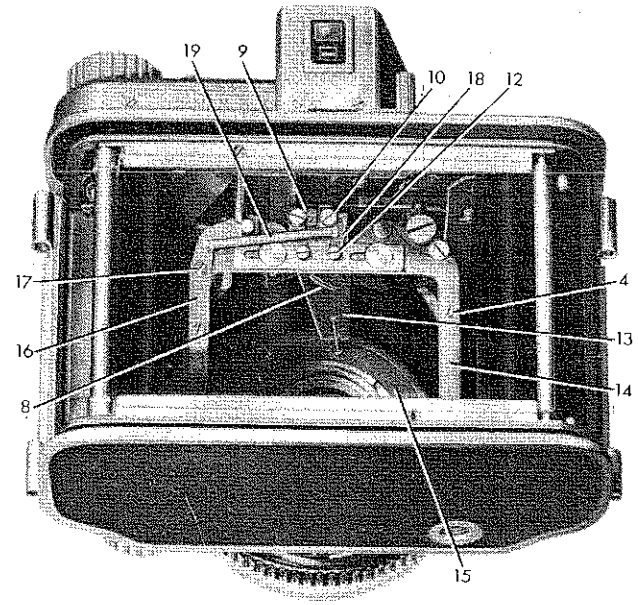
← TYPE A

Index No.	Nomenclature
1	Focusing tube guide plate to tube screw (E.K.Co. Part No. 86684)
2	Focusing tube guide plate (E.K.Co. Part No. 86683)
3	Shutter operating lever spring (E.K.Co. Part No. 78754)
4	Focusing tube guide to tube lower screw (E.K.Co. Part No. 78750)
5	Shutter operating lever (E.K.Co. Part No. 78755)
6	Focusing tube guide assembly (E.K.Co. Part No. 81009)
7	Shutter operating disc assembly (E.K.Co. Part No. 80916)
8	Shutter operating lever stud (E.K.Co. Part No. 78758)

TYPE B →

Index No.	Nomenclature
9	Left shutter operating lever lug (E.K.Co. Part No. 93291)
10	Slide lug screw (E.K.Co. Part No. 87718)
11	Right shutter operating lever lug (E.K.Co. Part No. 93292)
12	Lower operating lever lug screw (E.K.Co. Part No. 85052)
13	Shutter operating lever and end assembly (E.K.Co. Part No. 87449)
14	Focusing tube guide assembly (E.K.Co. Part No. 88365)
15	Shutter operating disc (E.K.Co. Part No. 78975)
16	Focusing tube guide lug assembly (E.K.Co. Part No. 92559)
17	Focusing tube guide lug to focusing tube guide screw (E.K.Co. Part No. 85052)





← TYPE C

Index No.	Nomenclature
18	Right shutter operating lever lug assembly (E.K.Co. Part No. 94288)
19	Guide lug spring (E.K.Co. Part No. 94166)

Figure 21—Camera Types

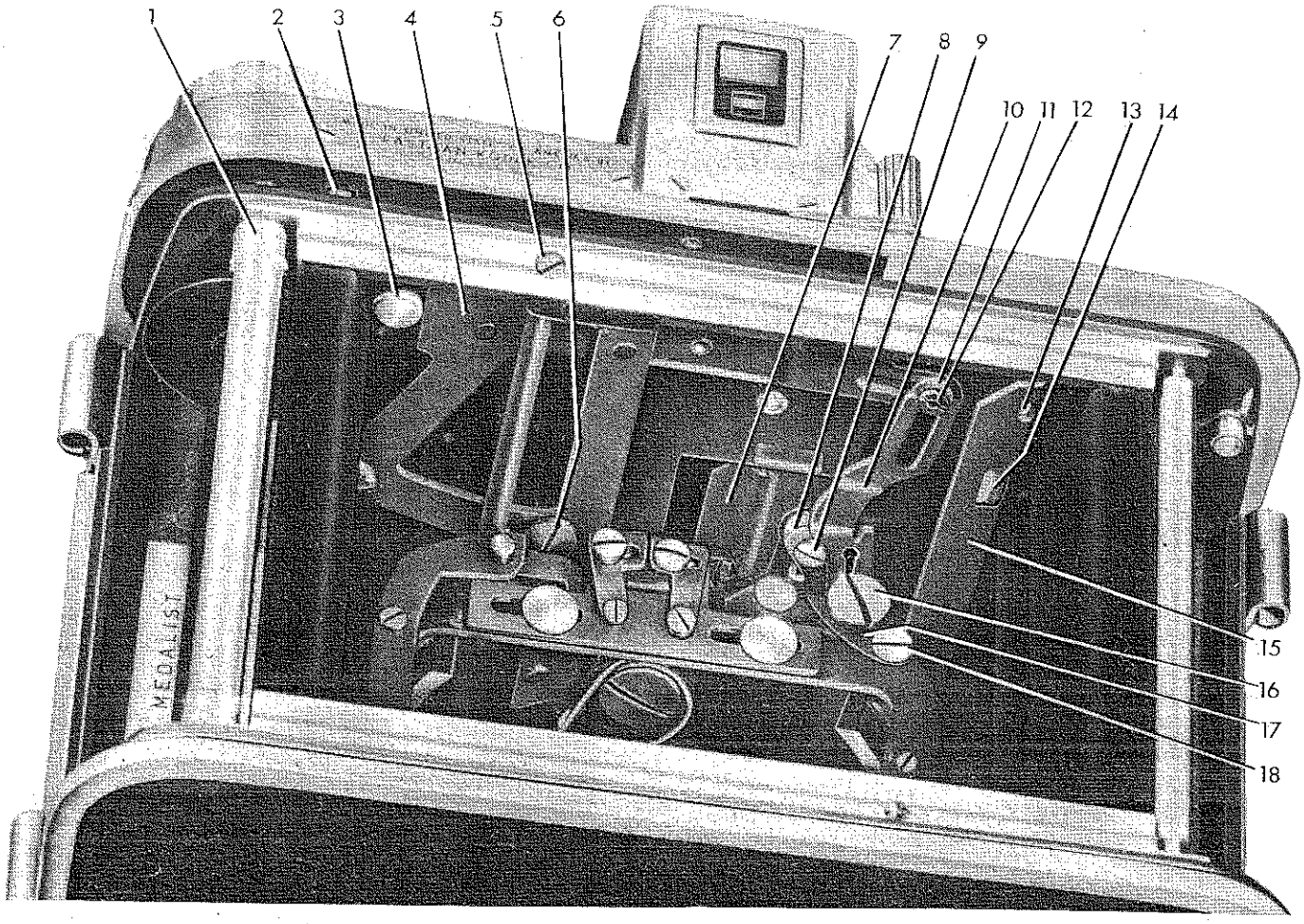


Figure 22—Parts Under Mechanism Plate

Index No.	Nomenclature
1	Safety control driving shaft assembly
2	Safety latch
3	Shutter setting gear shaft assembly
4	Shutter setting blade assembly
5	Upper guide rod
6	Shutter setting blade stud nut
7	Trigger plate
8	Range finder actuating lever assembly
9	Range finder actuating lever to range finder cam screw
10	Range finder actuating lever link
11	Range finder actuating lever link washer
12	Range finder actuating lever link nut
13	Range finder couplet bar shaft
14	Range finder couplet bar spring
15	Range finder couplet bar
16	Range finder adjusting screw
17	Range finder adjusting screw bracket
18	Range finder adjusting screw lock stud

depth-of-focus scale (2). If necessary, push the depth-of-focus scale out of the focusing scale frame.

NOTE

On some cameras, the focusing scale frame is held in place by spring tension only. With a camera of this type, simply pry up the frame.

d. DIRECT VIEW FINDER COVER ASSEMBLY. (See figure 23.)

(1) Remove the four direct view finder to range finder plate screws (3), two under the view finder and range finder windows on the back of the direct view finder cover assembly (4), and two next to the range finder windows on the front of the cover assembly. Lift off the direct view finder cover assembly, being careful to lift it straight up.

CAUTION

If the cover assembly is pulled off at an angle, it will strike the parallax frame assembly (7) and may bend it out of adjustment.

(2) When the cover assembly is lifted off, the focusing scale (5) will spin counterclockwise because it is mounted under spring tension. On reassembly, refer to paragraph 6.m., this section, for instructions on resetting the scale.

e. TIME LEVER HOUSING COMPLETE. (See figure 24.)

(1) Turn the time lever counterclockwise as far as it will go, and loosen the time lever key screw (2) enough to disengage it from the slot in the trigger button (7).

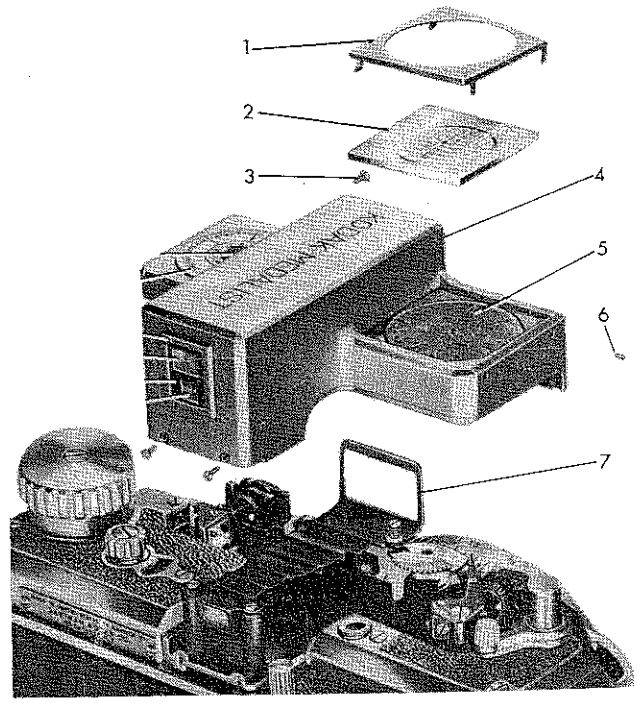


Figure 23—Direct View Finder Cover Assembly, Exploded from Camera

Index No.	Nomenclature
1	Focusing scale frame
2	Depth-of-focus scale
3	Direct view finder to range finder plate screw
4	Direct view finder cover assembly
5	Focusing scale
6	Depth-of-focus scale frame to cover screw
7	Parallax frame assembly

NOTE

The range finder plate can be removed from the camera with the time lever housing complete (3) still attached to it. The time lever key screw must, however, be loosened.

(2) Remove the three time lever housing to range finder plate screws (1), and remove the time lever housing complete (3). This will free the exposure indicator tube (6) which is inserted in the range finder plate directly above the red signal, and the exposure indicator tube can be lifted off.

(3) Lift off the trigger button leak light washer (4). If necessary, remove also the trigger bushing leak light washer (5) which is cemented to the range finder plate.

f. COUNTER DIAL HOUSING COMPLETE. (See figure 25.)

(1) Remove the key knob screw (1) and lift off the key knob (2).

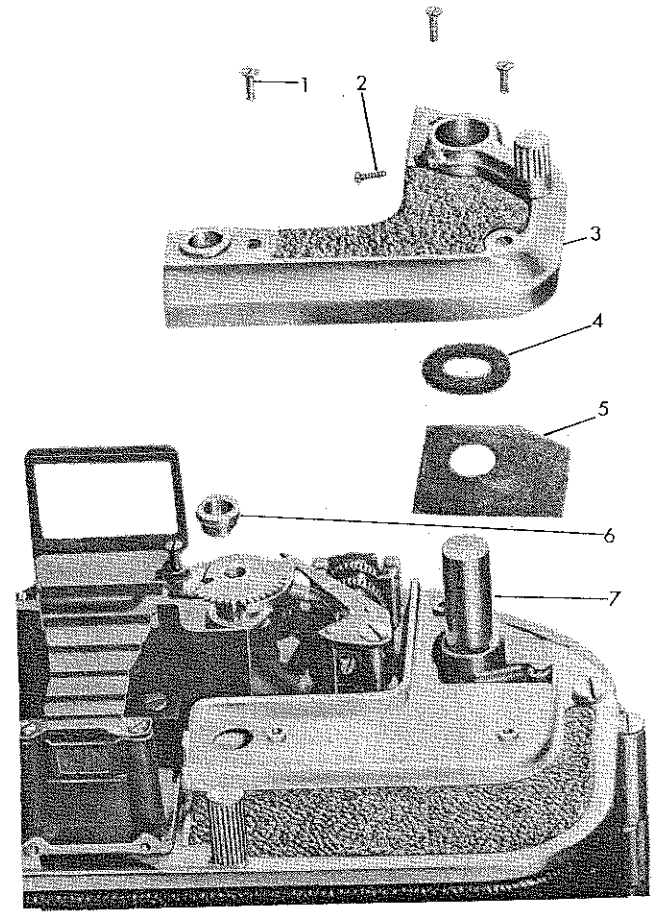


Figure 24—Time Lever Housing Complete, Exploded from Camera

Index No.	Nomenclature
1	Time lever housing to range finder plate screw
2	Time lever key screw
3	Time lever housing complete
4	Trigger button leak light washer
5	Trigger bushing leak light washer
6	Exposure indicator tube
7	Trigger button

(2) Remove the three counter dial housing to range finder plate screws (3), and lift off the counter dial housing complete (4), together with the origin plate (5) and the two origin plate screws (6).

(3) Remove the key post spring washer (7). Note that this washer is placed on the key post with the concave side upward. Some cameras also have a flat key post spacing washer (8). This is for the purpose of preventing the key knob (2) from wobbling as it is turned. If a key post spacing washer is used, be sure to replace it on reassembly.

g. COUNTER DIAL ASSEMBLY AND SAFETY CONTROL STOP PAWL.

NOTE

The range finder plate can be removed from the camera with these parts still fastened to

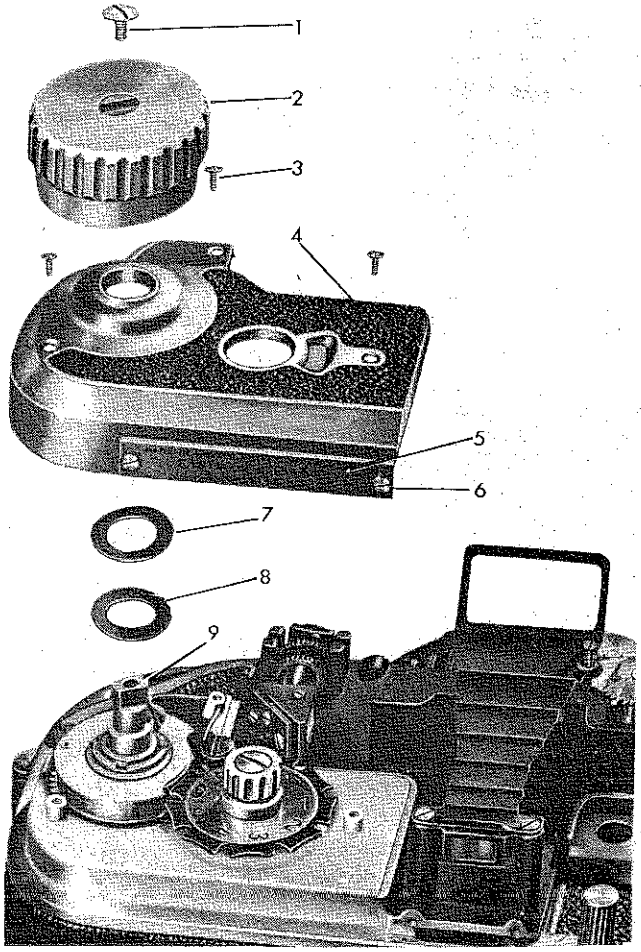


Figure 25—Counter Dial Housing Complete, Exploded from Camera

Index No.	Nomenclature
1	Key knob screw
2	Key knob
3	Counter dial housing to range finder plate screw
4	Counter dial housing complete
5	Origin plate
6	Origin plate screw
7	Key post spring washer
8	Key post spacing washer
9	Key complete

it. However, if they are left on, the counter dial assembly must be turned to any number except "0" in order to move the end of the safety control stop pawl (19, figure 27) away from the safety control cam complete (23, figure 27).

(1) Holding down the counter dial assembly (3, figure 26) with the fingers, remove the counter knob screw (1, figure 26). Then lift off the counter knob washer (2, figure 26), the counter dial assembly, and the counter knob spring (4, figure 26).

(2) Unhook the straight end of the safety control stop pawl spring (20, figure 27) from the projecting lug on the range finder plate. Then remove the safety

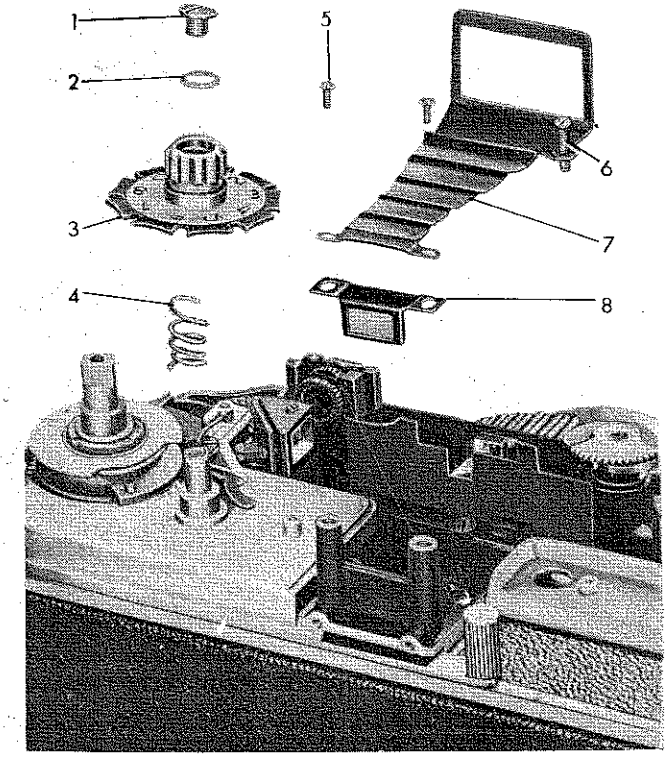


Figure 26—Counter Dial Assembly, Exploded from Camera

Index No.	Nomenclature
1	Counter knob screw
2	Counter knob washer
3	Counter dial assembly
4	Counter knob spring
5	Range finder eyelet frame screw
6	Parallax adjusting screw
7	Parallax frame assembly
8	Range finder eyelet lens assembly

control stop pawl stud (21, figure 27) and lift off the safety control stop pawl spring and the safety control stop pawl (19, figure 27).

h. RANGE FINDER PLATE.

(1) Remove the range finder plate to mechanism plate screw (16, figure 27) directly in front of the range finder eyepiece and under the parallax frame assembly (7, figure 26). If the screw cannot be turned without removing the parallax frame assembly, be sure to note very carefully the position of the parallax frame assembly before removing the two range finder eyelet frame screws (5, figure 26) which hold the parallax frame assembly and the range finder eyelet lens assembly (8, figure 26) to the range finder plate. On reassembly, the parallax frame assembly must be replaced in the same relation to the range finder reflection guard (18, figure 27).

CAUTION

The parallax frame assembly is made of thin metal and must be handled with care. It should be removed only if necessary.

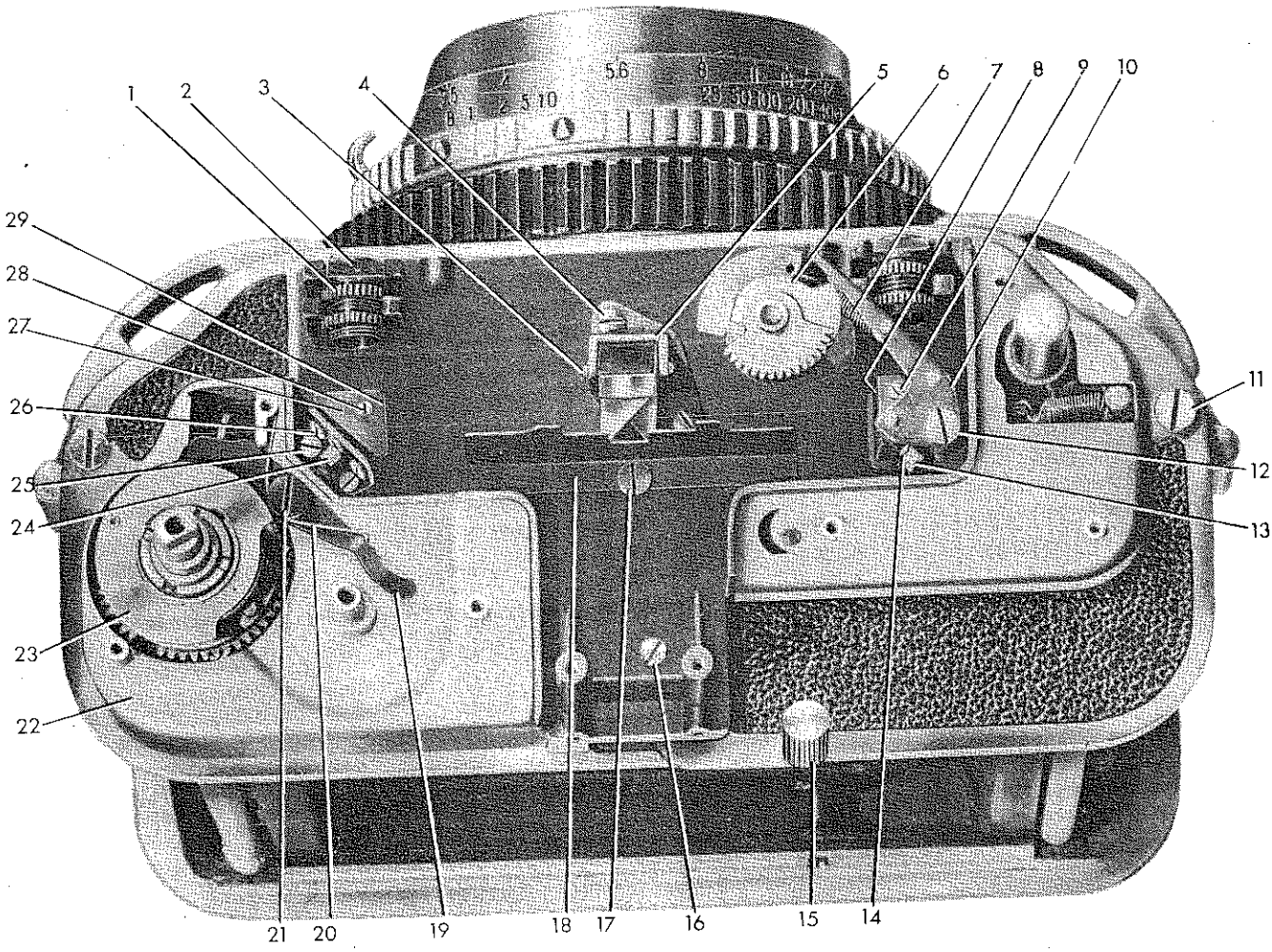


Figure 27—Range Finder Plate with Range Finder Optics

Index No.	Nomenclature
1	Objective lens mount nut
2	Objective lens mount assembly
3	Erecting prism retaining screw
4	Coincidence prism mount to range finder plate screw
5	Erecting and coincidence prism assembly
6	Range finder cam assembly
7	Range finder cam follower spring
8	End prism
9	End prism retaining screw
10	Cam follower assembly
11	Range finder plate to case screw
12	End prism bearing stud screw
13	End prism bracket to mount screw
14	End prism bracket to mount screw
15	Shutter setting lever pin and lever assembly
16	Range finder plate to mechanism plate screw
17	Range finder reflection guard screw
18	Range finder reflection guard
19	Safety control stop pawl
20	Safety control stop pawl spring
21	Safety control stop pawl stud
22	Range finder plate complete
23	Safety control cam complete
24	End prism bracket to mount screw
25	Left end prism bracket mounting screw
26	End prism bracket to mount screw
27	Left end prism assembly
28	End prism retaining screw
29	End prism

(2) If the counter dial assembly (3, figure 26) was left on the range finder plate, temporarily replace the key knob (2, figure 25) on the key post and follow through the cycle of operation of the camera as described in section VI, paragraph 3.a., until the cut-out on the safety control cam complete (23, figure 27) faces toward the counter dial assembly.

(3) Remove the two range finder plate to case screws (11, figure 27), one at each end of the range finder plate.

(4) With the focusing tube assembly all the way in, turn the range finder cam assembly (6, figure 27) counterclockwise until the first tooth of the gear on the cam assembly is opposite the end of the cam follower assembly (10, figure 27). This will allow the range finder actuating lever assembly (8, figure 22) to pass through the hole in the mechanism plate assembly (33, figure 28), and the range finder plate complete (22, figure 27), together with the range finder optics, can be lifted off. The shutter setting lever pin

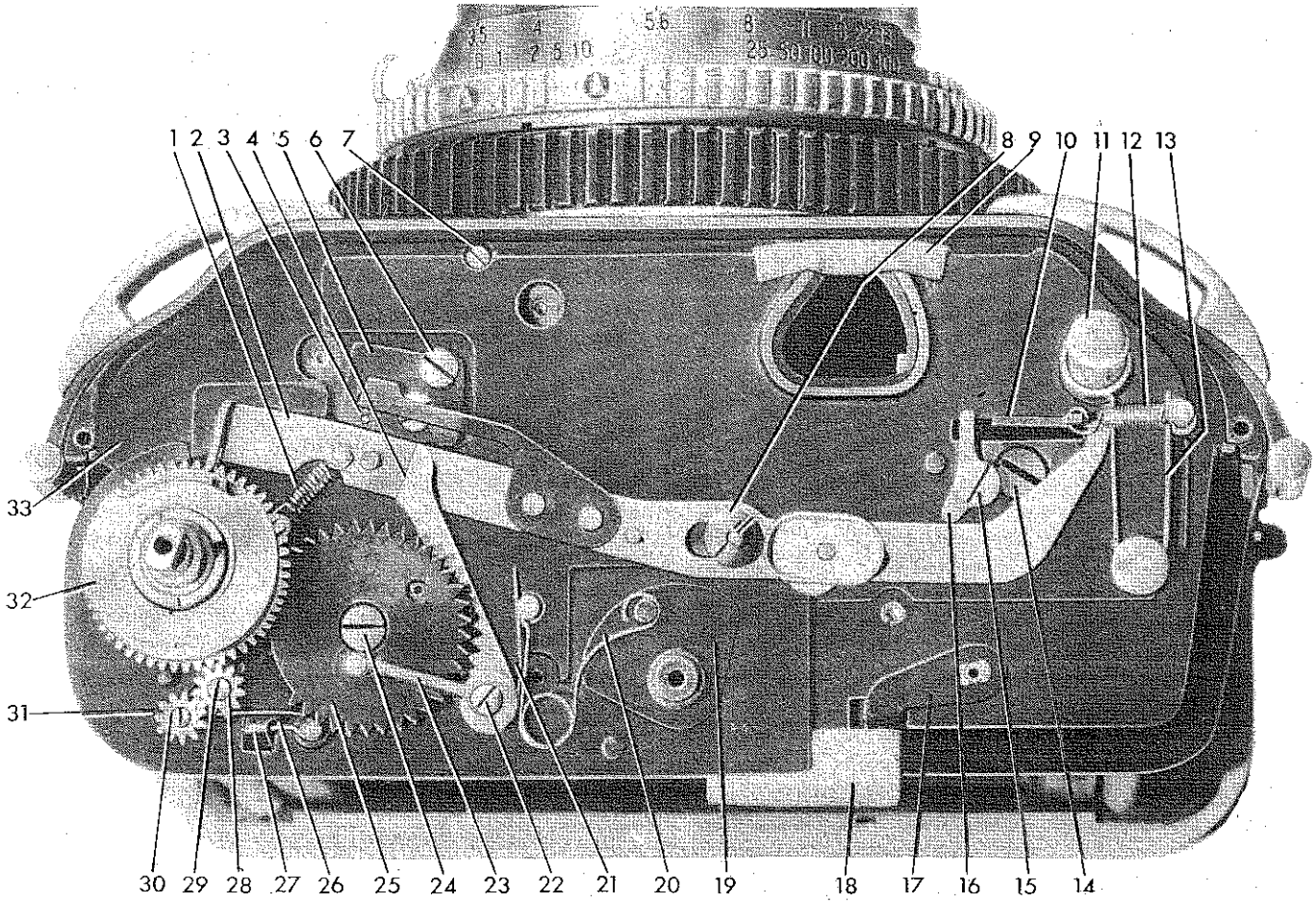


Figure 28—Mechanism Plate and Parts on Mechanism Plate

Index No.	Nomenclature
1	Safety lever spring
2	Safety lever assembly
3	Safety lever stop plate dowel
4	Shutter setting gear stop lever
5	Safety lever spring stop plate
6	Safety lever spring stop plate to mechanism plate screw
7	Guide rod clamping screw
8	Safety lever to plate stud nut
9	Range finder actuating lever opening liner
10	Trigger plate
11	Trigger button
12	Trigger plate spring
13	Trigger lock spring
14	Mechanism plate to spacer screw
15	Trigger plate bell crank stud
16	Trigger plate bell crank
17	Upper range finder coupler arm
18	Wedge for holding range finder couplet bar
19	Shutter setting lever light guard
20	Shutter setting guide spring
21	Shutter setting stop lever spring
22	Shutter setting stop stud
23	Shutter setting gear spring
24	Shutter setting gear to shaft screw
25	Shutter setting gear assembly
26	Safety latch spring
27	Safety latch
28	Safety control idler gear
29	Gear to idler gear stud screw
30	Gear to shaft screw
31	Safety control gear
32	Safety control cam complete
33	Mechanism plate assembly

and lever assembly (15, figure 27) will come off with the range finder plate and can be pulled out through the slot in the range finder plate in which it rests.

(5) As soon as the range finder plate is removed, the range finder couplet bar (15, figure 22) beneath the mechanism plate will drop down. In order to prevent the range finder adjusting screw bracket (17, figure 22) from catching on the couplet bar and throwing the range finder out of adjustment, turn the upper range finder coupler arm (17, figure 28) toward the back of the camera. Then, pushing up on the range finder couplet bar, turn the upper range finder coupler arm back toward the camera until it fits in the slot in the mechanism plate, and wedge it in place. The wedging is most conveniently accomplished by inserting a small tapered wood block (18, figure 28) in the channel to the left of the upper range finder coupler arm in which the top of the camera back fits.

NOTE

The lower (unbroken) edge of the range finder couplet bar must fit in the slot between the range finder adjusting screw (16, figure 22) and the range finder adjusting screw lock stud (18, figure 22).

(6) At this point study carefully paragraph 3, this section. A thorough understanding of the functioning of the various parts which are now

exposed will be found invaluable in making repairs to the mechanism.

i. PARTS ON MECHANISM PLATE. (See figure 28.)

(1) Unhook the safety lever spring (1) where it hooks on the safety lever assembly (2) near the left end.

(2) Remove the safety lever to plate stud nut (8) and lift off the safety lever assembly (2).

(3) Lift off the safety control cam complete (4, figure 29) and the key complete (7, figure 29) together with the key post washer (5, figure 29) and the key post gear (6, figure 29).

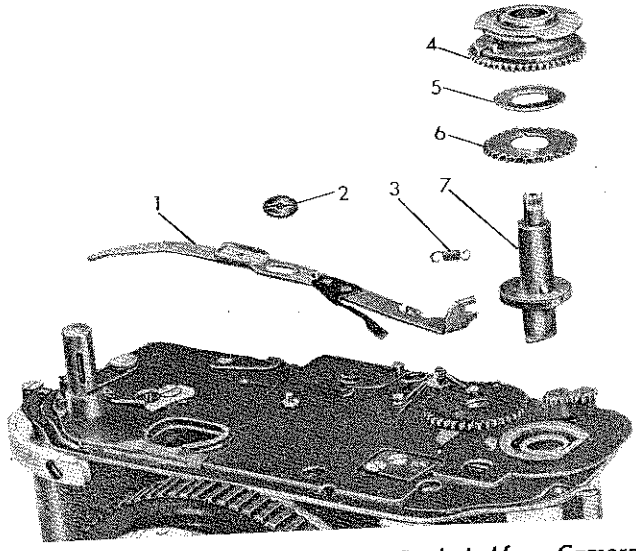


Figure 29—Parts on Mechanism Plate, Exploded from Camera

Index No.	Nomenclature
1	Safety lever assembly
2	Safety lever to plate stud nut
3	Safety lever spring
4	Safety control cam complete
5	Key post washer
6	Key post gear
7	Key complete

(4) Remove the gear to shaft screw (30) and lift off the safety control gear (31).

(5) Remove the trigger plate bell crank stud (15) and lift off the trigger plate bell crank (16).

j. REMOVAL OF SHUTTER.

NOTE

The shutter complete (1, figure 30) need not be removed from the camera except when repairs to the shutter blades, diaphragm wings, or delayed action gears are to be made or when the focusing tube assembly (6, figure 30) is to be removed from a camera of type B or type C. Shutter repairs involving the disassembly described up to paragraph 2.n.(4), this section, can be made without removing the shutter from the camera.

(1) Using special tool No. 501-A, take the initial tension off the shutter retaining ring (11, figure 33) located directly behind the speed control ring with pointers assembled (10, figure 33). With a jeweler's screw driver, unscrew the shutter retaining ring until the shutter complete (1, figure 30) comes loose and can be lifted out of the focusing tube assembly (6, figure 30). The shutter retaining ring will remain on the shutter complete.

(2) Lift the shutter light guard (2, figure 30) out of the focusing tube assembly.

CAUTION

The shutter light guard is made of thin metal and must be handled with care. If it is bent by rough handling, it may bind on the shutter operating disc and cause faulty operation of the shutter or, in severe cases, jamming of the camera.

(3) For instructions on disassembling the lens and shutter, refer to paragraph 2.n., this section.

k. FOCUSING TUBE ASSEMBLY.

(1) With a camera of type A, remove the two focusing tube guide plate to tube screws (1, figure 21) which extend through the focusing tube guide plate (2, figure 21). On cameras of types B and C, remove the two focusing tube guide to focusing tube screws (17, figure 30). These are the two small flathead screws underneath the shutter operating lever slide on the focusing tube guide assembly (14, figure 21).

(2) Remove the four focusing tube guide to tube lower screws (4, figure 21). On cameras of type A, lift off the focusing tube guide assembly (6, figure 21) together with the focusing tube guide plate (2, figure 21). The focusing tube guide plate is shellacked to the focusing tube guide assembly and should not be separated from it except when necessary, because the adjustment of the plate will be disturbed. On cameras of types B and C, removal of the four focusing tube guide to tube lower screws (4, figure 21) will free the focusing tube guide assembly (14, figure 21) together with the focusing tube guide lug assembly (16, figure 21), two focusing tube guide lug to focusing tube guide screws (17, figure 21), and, on cameras of type C only, the guide lug spring (19, figure 21). If necessary, the focusing tube guide lug assembly can be disassembled from the focusing tube guide assembly by removing the two focusing tube guide lug to focusing tube guide screws.

CAUTION

Unless it is necessary to adjust the shutter operating lever lugs (on cameras of types B and C), do not disturb the two lower operating lever lug screws (12, figure 21) or the two slide lug screws (10, figure 21).

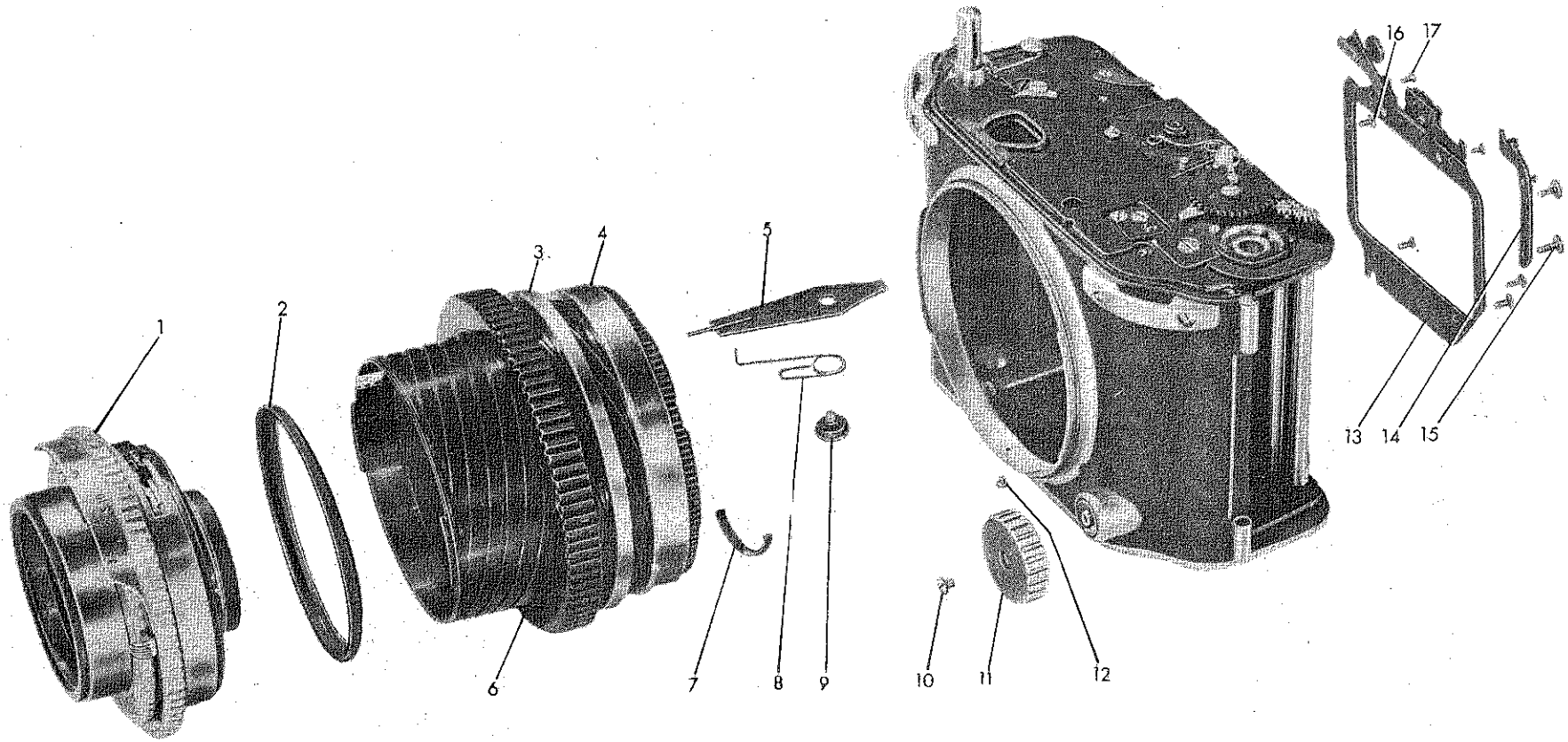
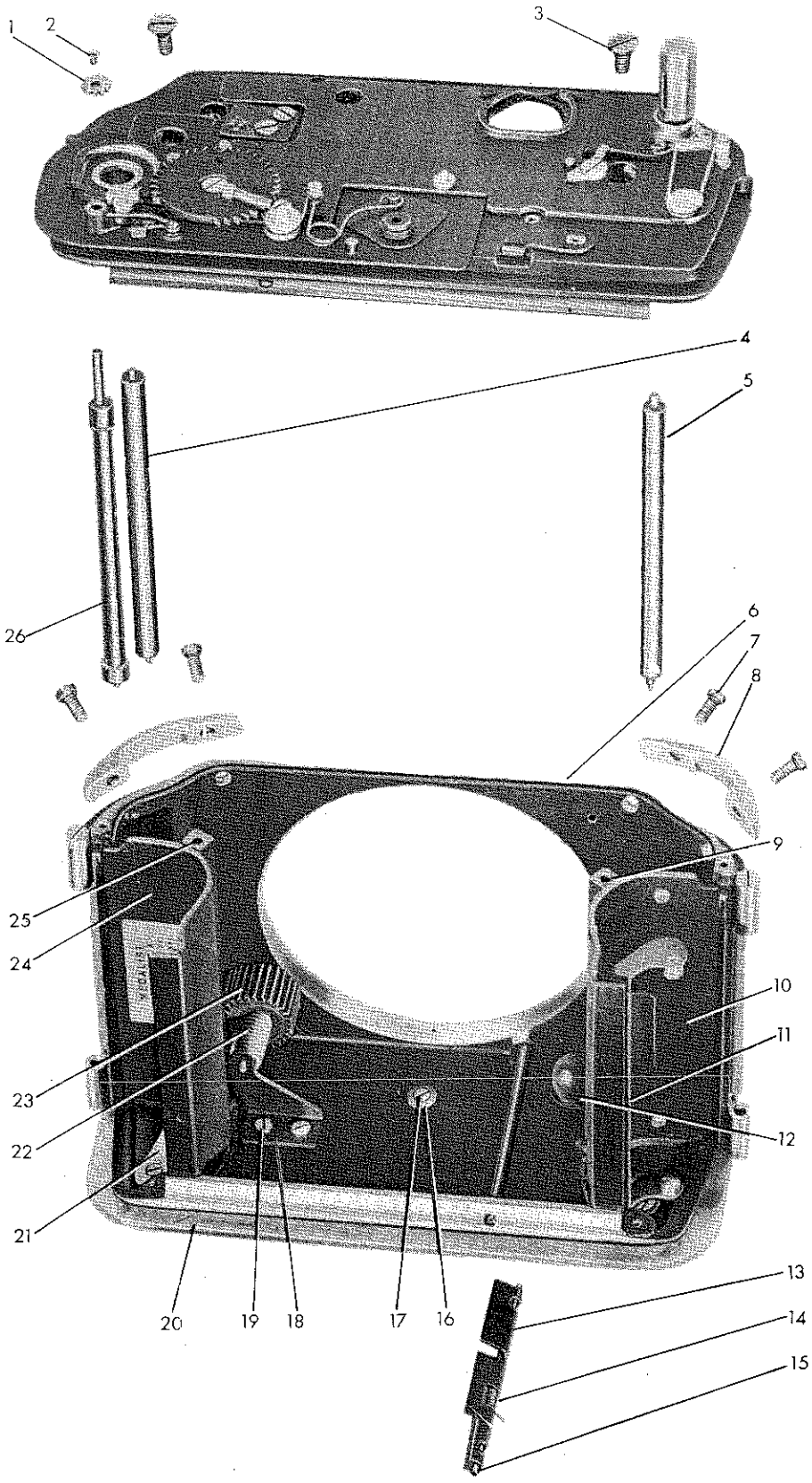


Figure 30—Shutter and Focusing Tube Assembly, Exploded from Camera Case

Index No.	Nomenclature
1	Shutter complete
2	Shutter light guard
3	Focusing tube insert retaining ring
4	Focusing tube insert
5	Shutter operating lever and end assembly
6	Focusing tube assembly
7	Focusing tube stop
8	Shutter operating lever spring
9	Shutter operating lever stud
10	Focusing knob screw
11	Focusing knob
12	Focusing tube retaining ring lock screw
13	Focusing tube guide assembly
14	Focusing tube guide lug assembly
15	Focusing tube guide lug to focusing tube guide screw
16	Focusing tube guide to tube lower screw
17	Focusing tube guide to focusing tube screw



Index No.	Nomenclature
1	Safety control gear
2	Gear to shaft screw
3	Mechanism plate to spacer screw
4	Left-hand case film roller
5	Right-hand case film roller
6	Case covered
7	Case to mechanism plate screw
8	Neck strap bracket
9	Right-hand mechanism plate spacer
10	Right-hand spool housing assembly
11	Spool holder assembly
12	Tripod nut
13	Range finder couplet bar
14	Range finder couplet bar spring
15	Range finder couplet bar shaft
16	Bottom plate to case washer
17	Bottom plate to case screw
18	Focusing idler gear bracket
19	Idler gear bracket screw
20	Bottom plate covered
21	Spool tension
22	Focusing idler gear shaft
23	Focusing idler gear
24	Left-hand spool housing
25	Left-hand mechanism plate spacer
26	Safety control driving shaft assembly

Figure 31—Mechanism Plate, Exploded from Camera Case

(3) Remove the focusing knob screw (10, figure 30) and the focusing knob (11, figure 30). Check for a washer under the focusing knob. If there is one, be sure to replace it on reassembly.

(4) Remove the focusing tube retaining ring lock screw (12, figure 30).

(5) Use special tool No. 501-B to loosen the focusing tube insert retaining ring (3, figure 30), and unscrew the insert retaining ring. Then, grasping the case in one hand, work the focusing tube assembly (6, figure 30) out of the case with the other hand, using no more pressure on the case or focusing tube assembly than is necessary.

l. MECHANISM PLATE. (See figure 31.)

(1) Remove the four case to mechanism plate screws (7) which also hold the two neck strap brackets (8) in place.

(2) Remove the two mechanism plate to spacer screws (3), one just in front of the key post bushing, the other about the same distance in back of the trigger button.

(3) The mechanism plate is sealed to the case with heavy black lacquer, and to separate the two assemblies, it is necessary to break the seal.

(a) First try to lift up the mechanism plate by finger pressure at the ends, being careful to push the plate as nearly straight up as possible in order to avoid bending the safety control driving shaft assembly (26) where it passes through the mechanism plate.

(b) If the mechanism plate is sealed to the case too tightly to come loose with finger pressure, hold the camera against the body to absorb the shock, place a block of fiber or soft wood against the end of the mechanism plate near the key post bushing, and tap the block gently until the seal is just broken loose.

CAUTION

Do not place the block against the key post bushing or the bushing may be forced out of position.

(4) Repeat the procedure at the other end of the mechanism plate to break the seal completely. Then work the mechanism plate off the case, pushing it as nearly straight up as possible in order to avoid bending the safety control driving shaft assembly (26).

(5) Removal of the mechanism plate will free the safety control driving shaft assembly (26), the left-hand case film roller (4), the right-hand case film roller (5), and the following three parts together: the range finder couplet bar shaft (15), the range finder couplet bar (13), and the range finder couplet bar spring (14). These parts can be lifted out if they do not fall out.

NOTE

In some cases, the safety control driving shaft assembly may be assembled loosely enough so that a safety control driving shaft collar and a safety control driving disc may fall off the safety control driving shaft. If this happens, reassemble the driving shaft assembly immediately unless the teeth on the safety control driving disc are worn so that the disc requires replacement. In this case, replace the entire assembly.

m. SPOOL HOUSING, FOCUSING GEARS, AND SPACERS. (See figure 31.)

(1) The left-hand spool housing (24) and the right-hand spool housing (10) are sealed to the bottom of the case covered (6) with heavy black lacquer in the same manner that the mechanism plate was sealed to the top front of the case. Break the seal by working the spool housing back and forth slightly with the fingers, and then lift off the spool housings.

(2) Remove the two idler gear bracket screws (19), and lift off the focusing idler gear bracket (18) together with the focusing idler gear shaft (22) and the focusing idler gear (23).

(3) Remove the three bottom plate to case screws (17), lift off the two bottom plate to case washers (16) in the center and at the right, and the spool tension (21) at the left. The bottom plate covered (20) is now free from the case.

(4) Remove the two case to spacer screws, and lift off the left-hand mechanism plate spacer (25) and the right-hand mechanism plate spacer (9). When the left-hand mechanism plate spacer is removed, the focusing pinion will be free, and it can be lifted out.

n. DISASSEMBLY OF SHUTTER.

CAUTION

Special coatings have been applied to the inner air-glass surfaces of the lens to reduce internal reflections and increase light transmission. Since these coatings are considerably softer than glass, extreme care must be exercised in handling the lens elements. Do not under any circumstances touch the inner surfaces which will be exposed by removal of the lens from the shutter. Refer to section V, paragraph 2.

(1) PARTS ON FRONT OF SHUTTER. (See figure 33.)

(a) Placing the shutter on special tool No. 501-W, remove the front lens mount together with the adapter ring insert, Series VI (1, figure 32), using special tool No. 501-O if necessary.

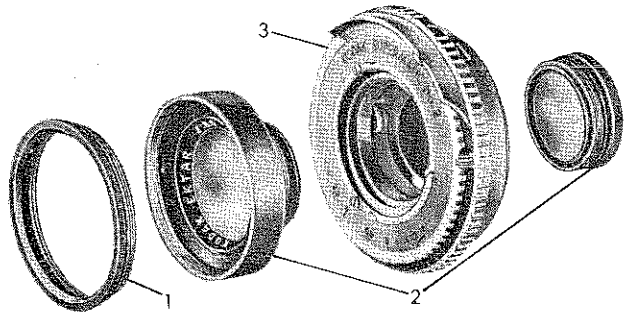


Figure 32—Shutter Complete, Exploded

Index No.	Nomenclature
1	Adapter ring insert, Series VI
2	Assembly of 100-mm Formula J-13 f/3.5 Kodak Ektar Lens
3	Shutter assembled

(b) Unscrew the rear lens mount with the fingers. No special tool is necessary.

(c) Remove the three diaphragm control ring retainer screws (1), being careful not to let the screw driver slip and strike the shutter blades. Shutters on cameras of type A do not have these screws but are equipped instead with a lens adapter (E.K.Co. Part No. 78972), which is held in place by an adapter lock screw (E.K.Co. Part No. 71485). Remove the lock screw, and unscrew the lens adapter, using special tool No. 501-U (with Handle No. 84) to remove the initial tension.

(d) Lift up the diaphragm control ring retainer (7), with the blade of a screw driver.

(e) Lift off the diaphragm control ring with pointer assembled (8). When the control ring is removed from shutters on cameras of types B and C, two diaphragm control ring springs (2) will fall out. If necessary, remove the two diaphragm pointer to diaphragm control ring screws (4) and the diaphragm pointer (3).

(f) Remove the two speed index plate anchor stud screws (5), and lift off the speed and diaphragm index plate (9). The speed control ring tension spring (6) will usually fall out when the index plate is lifted off. On cameras of type A, the speed and diaphragm index plate (E.K.Co. Part No. 78956) is located by one stud, and no screws are used; simply lift off the index plate.

(g) Lift off the speed control ring with pointers assembled (10).

(h) Lift off the shutter retaining ring (11).

(i) Disengage and lift off the delayed action winding lever (12).

(2) COVER COMPLETE AND ASSOCIATED PARTS. (See figure 34.)

(a) Unhook the delayed action trigger latch spring (12) where it hooks around the delayed action trigger latch (13). When the spring is unhooked, the delayed action gear train will run down.

(b) Remove the delayed action trigger latch screw (1), and lift off the delayed action trigger latch (13).

(c) Lift off the spring cam (2) and the high speed spring (2, figure 35).

(d) Remove the short cover screw (3) near the spring cam opening and the two long cover screws (8) toward the bottom of the shutter. Then lift off the cover complete (7, figure 35).

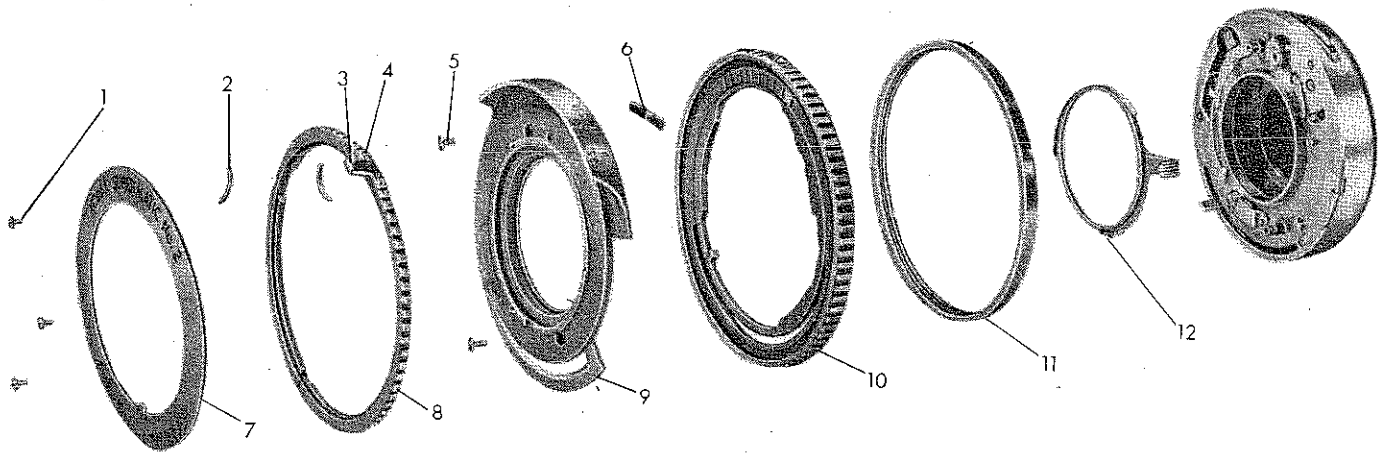


Figure 33—Parts on Front of Shutter, Exploded

Index No.	Nomenclature
1	Diaphragm control ring retainer screw
2	Diaphragm control ring spring
3	Diaphragm pointer
4	Diaphragm pointer to diaphragm control ring screw
5	Speed index plate anchor stud screw
6	Speed control ring tension spring
7	Diaphragm control ring retainer
8	Diaphragm control ring with pointer assembled
9	Speed and diaphragm index plate
10	Speed control ring with pointers assembled
11	Shutter retaining ring
12	Delayed action winding lever

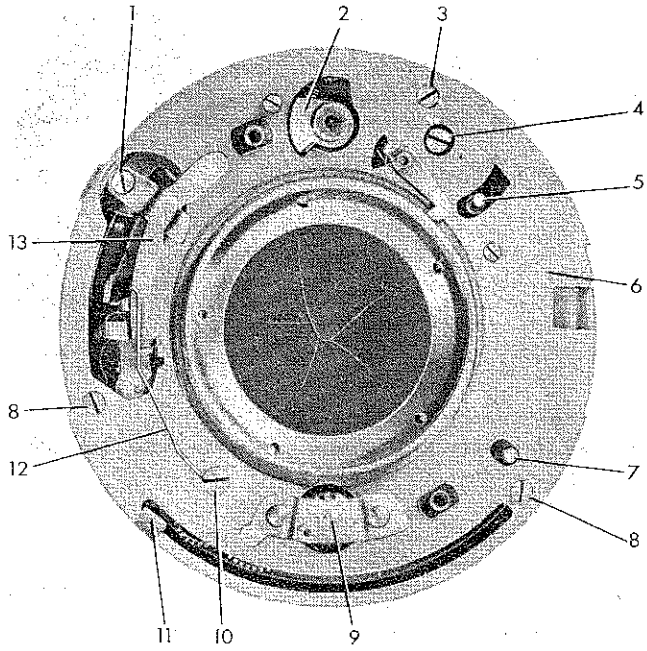


Figure 34—Shutter after Removal of Parts on Front

Index No.	Nomenclature
1	Delayed action trigger latch screw
2	Spring cam
3	Short cover screw
4	Retarding sector screw
5	Retarding sector with stud
6	Cover complete
7	Pallet bracket with studs assembled
8	Long cover screw
9	No. 1 gear with No. 1 pinion and spring assembled
10	Delayed action trigger latch spring screw
11	Diaphragm ring
12	Delayed action trigger latch spring
13	Delayed action trigger latch

(3) PARTS ON MECHANISM PLATE. (See figure 36.)

(a) Lift out the No. 1 gear with No. 1 pinion and spring assembled (12). If necessary, replace the delayed action winding spring (8, figure 37), inserting the short end of the spring through the hole in the gear.

(b) Remove the retarding sector screw (8). Then lift out together the retarding sector with stud (9) and the retarding sector spring (6). This is more easily accomplished with the shutter in a cocked position.

(c) Trip the shutter, and unhook the long end of the blade controller latch spring (7) where it hooks over the latch with main drive bushing and disc assembled with stud (4).

(d) Using a small pair of pliers to remove the initial tension, remove the main drive screw (3).

(e) Unhook the main drive spring (2) by pushing down the end which is hooked over the end of the delayed action gear plate with stud assembled (14). Then lift off the latch with main drive bushing and disc assembled with stud (4) together with the main drive spring (2). If necessary, unhook the main drive spring from the latch with main drive bushing and disc assembled with stud.

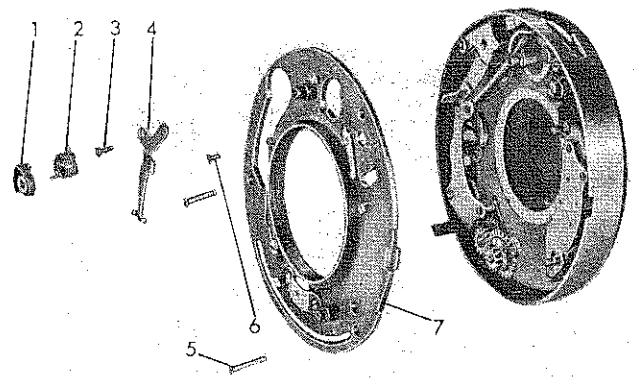


Figure 35—Cover Complete and Associated Parts, Exploded from Shutter Case

Index No.	Nomenclature
1	Spring cam
2	High speed spring
3	Delayed action trigger latch screw
4	Delayed action trigger latch
5	Long cover screw
6	Short cover screw
7	Cover complete

(f) Open the shutter blades by pushing in a clockwise direction the lever which extends through the mechanism plate under the pinion end of the retard gear plate with No. 1 pinion assembled (11). Then open the diaphragm wings with the projecting lever on the diaphragm ring (13) which extends above the top of the shutter case. These precautions will prevent accidental damage to the shutter blades or diaphragm wings during subsequent disassembly operations.

(g) Remove the trigger screw (17), trigger spring (15), and trigger washer (16).

(h) Lift up together the trigger and collar assembled (19), one bulb lever spacer (18), and the bulb lever assembly (1).

CAUTION

Be careful not to force these parts in removing them because either the trigger or the bulb lever assembly may be damaged by bending.

(i) Remove the remaining bulb lever spacer (2, figure 38) from the lever stud.

(j) Remove the clutch screw (8, figure 44) and the clutch assembly (9, figure 44).

(k) If it is necessary to clean or replace any of the retard gears, refer to paragraph 5.a.(2), this section.

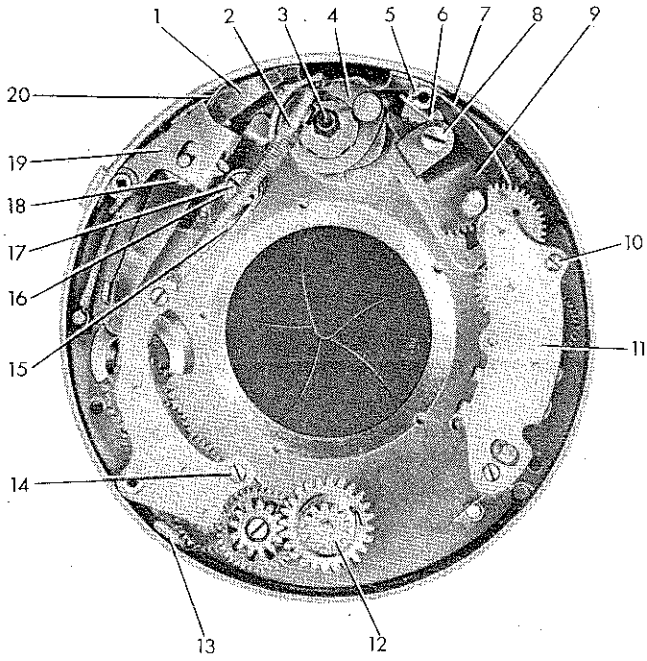


Figure 36—Shutter after Removal of Cover

Index No.	Nomenclature
1	Bulb lever assembly
2	Main drive spring
3	Main drive screw
4	Latch with main drive bushing and disc assembled with stud
5	Latch spring bushing
6	Retarding sector spring
7	Blade controller latch spring
8	Retarding sector screw
9	Retarding sector with stud
10	Gear plate screw
11	Retard gear plate with No. 1 pinion assembled
12	No. 1 gear with No. 1 pinion and spring assembled
13	Diaphragm ring
14	Delayed action gear plate with stud assembled
15	Trigger spring
16	Trigger washer
17	Trigger screw
18	Bulb lever spacer
19	Trigger and collar assembled
20	Bulb lever spring

(l) With a jeweler's screw driver, remove the latch spring bushing (5) and the blade controller latch spring (7).

(4) MECHANISM PLATE.

(a) Turn the shutter case over, unscrew the shutter operating disc bearing nut (3, figure 39), and lift off the shutter operating disc (2, figure 39) and the shutter operating disc spacer (1, figure 39). Cameras of type A will have a shutter operating disc bearing nut (E.K.Co. Part No. 78977R) and a shutter operating disc assembly (E.K.Co. Part No. 80916) which has a stud for the shutter operating lever (5, figure 21) instead of a hole for the shutter operating lever and end assembly (13, figure 21).

(b) Remove the long plate locating screw (6, figure 40) which screws into the stud on the delayed action gear plate with stud assembled (14, figure 36).

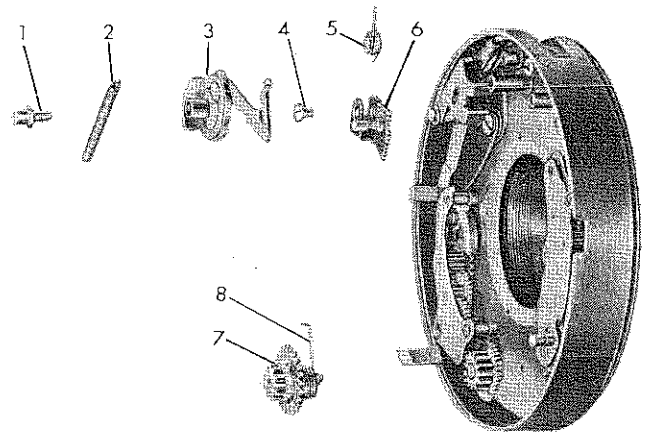


Figure 37—Parts on Shutter Mechanism Plate, Partially Exploded (I)

Index No.	Nomenclature
1	Main drive screw
2	Main drive spring
3	Latch with main drive bushing and disc assembled with stud
4	Retarding sector screw
5	Retarding sector spring
6	Retarding sector with stud
7	No. 1 gear with No. 1 pinion and spring assembled
8	Delayed action winding spring

(c) If it is necessary to clean or replace any of the delayed action gears, refer to paragraph 5.a.(3), this section.

(d) Turn the case over and remove the remaining long plate locating screw (6, figure 40). Then, holding the mechanism plate complete (1, figure 40) in place with the fingers, remove the short plate screw (7, figure 40). Again turn the case over and lift out the mechanism plate complete.

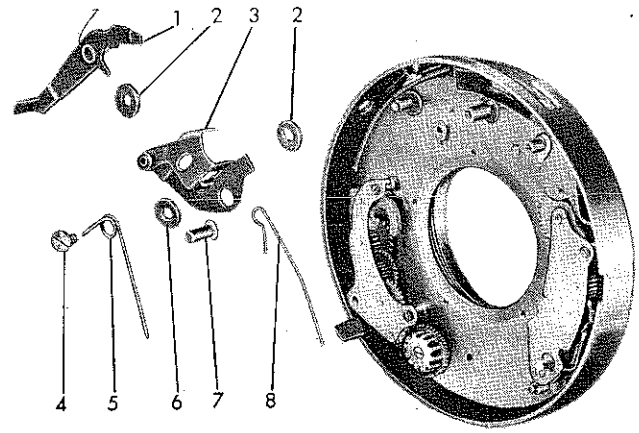


Figure 38—Parts on Shutter Mechanism Plate, Partially Exploded (II)

Index No.	Nomenclature
1	Bulb lever assembly
2	Bulb lever spacer
3	Trigger and collar assembled
4	Trigger screw
5	Trigger spring
6	Trigger washer
7	Latch spring bushing
8	Blade controller latch spring

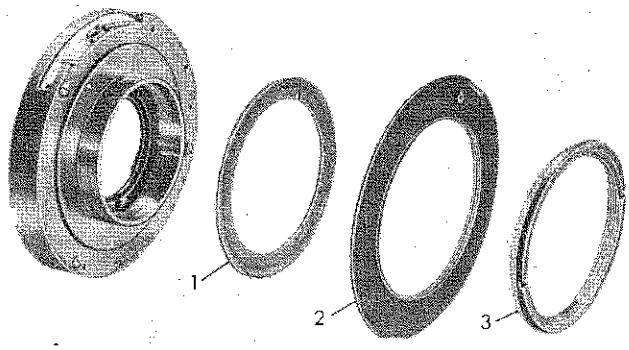


Figure 39—Parts on Back of Shutter Case, Exploded

Index No.	Nomenclature
1	Shutter operating disc spacer
2	Shutter operating disc
3	Shutter operating disc bearing nut

(e) The diaphragm retainer plate and wing assembly (6, figure 41) is attached to the underside of the mechanism plate by five retainer plate screws (7, figure 41). To expose the screw heads, fold the diaphragm wings in toward the center of the shutter. Then remove the screws and lift off the diaphragm retainer plate and wing assembly by inserting the blade of a jeweler's screw driver under the edge of the retainer plate.

NOTE

On reassembly, the retainer plate must be replaced in the same position from which it was removed. Refer to paragraph 6.b.(1)(d), this section.

(f) Turn the mechanism plate over and let the shutter blades (3, 4, and 5, figure 41) and the blade controller (2, figure 41) fall off. There are two blades with double blade bushing and stud (3, figure 41), three blades with stud (4, figure 41), and two plain blades (5, figure 41).

(g) Lift the diaphragm ring (2, figure 40) out of the case, and unhook the setting lever spring (3, figure 40) from the case with cable release nut (5, figure 40) and from the setting lever with stop stud (4, figure 40).

o. DISASSEMBLY OF BACK COMPLETE. (See figure 42.)

(1) Remove the two tension pad to back screws (1) and lift off the film tension pad assembly (2).

(2) Remove the seven window cover to back screws (3) and lift off the window slide cover assembly (4).

(3) Grasp the window slide spring (5) with a pair of tweezers and pull it out toward the top of the back.

(4) If necessary, use a No. 50 drill to remove the turned-over portion of the window slide button (11), being careful not to drill any deeper than is necessary to push the window slide button through toward the outside of the back. Lift off the window slide (10).

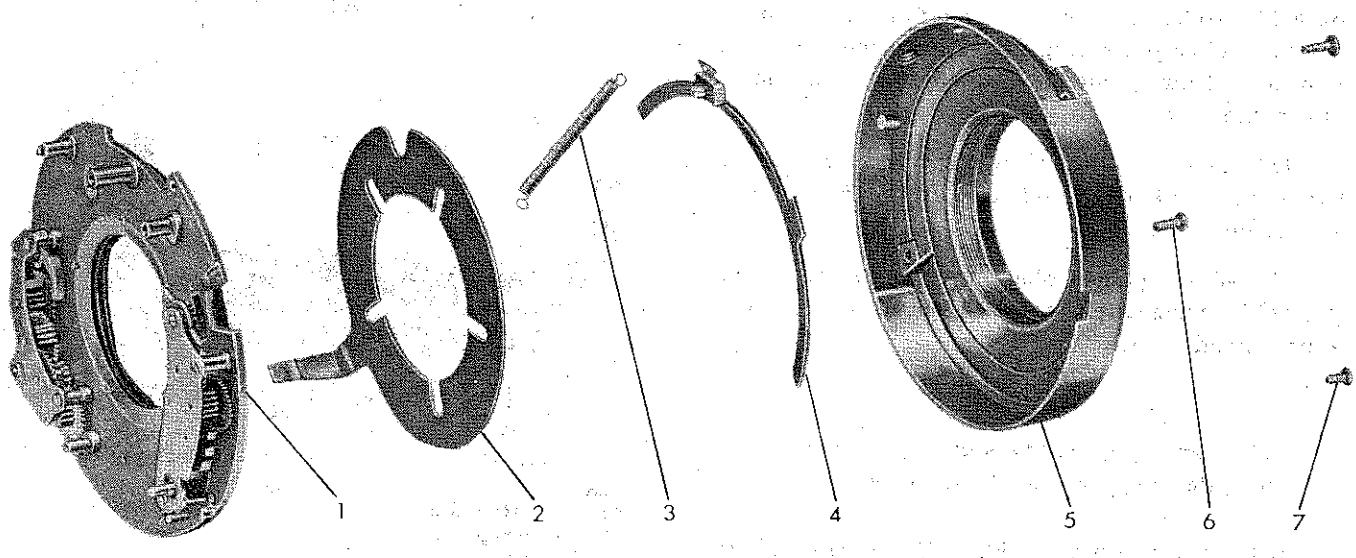


Figure 40—Shutter Mechanism Plate Complete, Exploded from Case

Index No.	Nomenclature
1	Mechanism plate complete
2	Diaphragm ring
3	Setting lever spring
4	Setting lever with stop stud
5	Case with cable release nut
6	Plate locating screw
7	Short plate screw

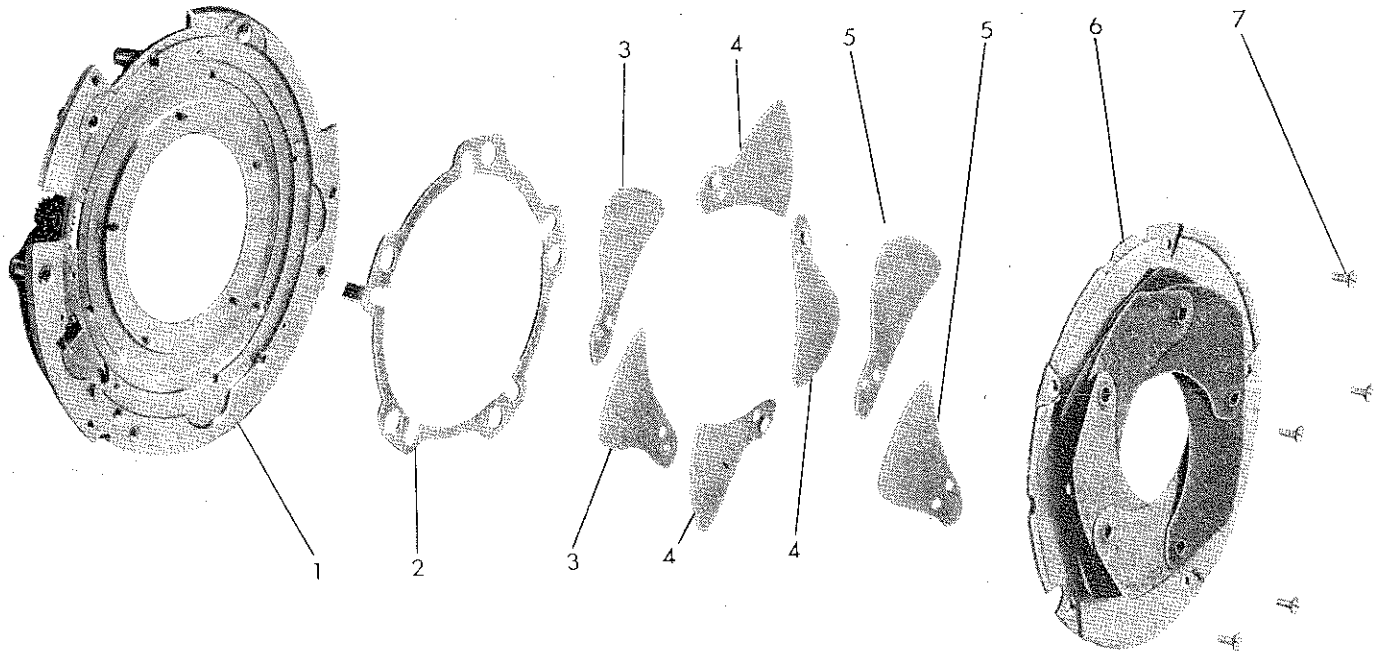


Figure 41—Shutter Mechanism Plate Complete, Exploded

Index No.	Nomenclature
1	Mechanism plate with studs, delayed action gears, and retard assembly
2	Blade controller
3	Blade with double blade bushing and stud
4	Blade with stud
5	Blade
6	Diaphragm retainer plate and wing assembly
7	Retainer plate screw

(5) With the blade of a small screw driver, push down the film roller pin (6) at the top end of the back film roller (8) far enough so that the pin can be disengaged from the bearing hole in the back. Lift off the back film roller together with the film roller pin and the film roller pin spring (7). The spring can be removed by drawing out the film roller pin from the end of the film roller.

(6) Remove the four hinge grip guide screws (9), two at each end of the back, and lift off the two hinge grip guides (15).

(7) With a pair of pliers, pull out the four hinge grips (14), being careful to pull them straight out with a firm, steady tension.

CAUTION

If the hinge grips are twisted or pulled out at an angle, they may be damaged or broken.

(8) When the hinge grips (14) are removed, the four hinge pins (13) and the two hinge pin springs will be free and they can be removed by releasing the hinge latches (12) which hold them in place.

(9) Remove the two hinge to latch screws and pry off the two hinge latches (12).

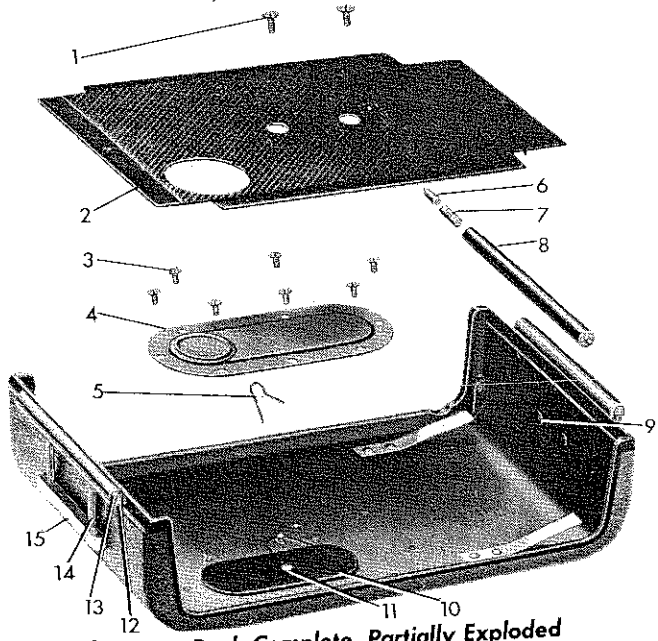


Figure 42—Back Complete, Partially Exploded

Index No.	Nomenclature
1	Tension pad to back screw
2	Film tension pad assembly
3	Window cover to back screw
4	Window slide cover assembly
5	Window slide spring
6	Film roller pin
7	Film roller pin spring
8	Back film roller
9	Hinge grip guide screw
10	Window slide
11	Window slide button
12	Hinge latch
13	Hinge pin
14	Hinge grip
15	Hinge grip guide

3. CYCLE OF OPERATION WITHOUT FILM.

a. WINDING THE MECHANISM WITHOUT THE USE OF FILM.—Whenever the mechanism is wound without film in the camera, the following procedure must be adhered to. Never turn the safety control driving shaft assembly (1, figure 22) except in this sequence:

(1) FIRST STEP.—With the focusing tube assembly extended at least to infinity and the exposure counter dial (if it has not been removed from the camera) set on any number except "0," turn the winding key knob until a distinct click is heard, indicating that the shutter has been cocked. If the winding key knob turns freely without cocking the shutter, follow through the second, third, and fourth steps and then start the cycle over again with the first step. When the first step is performed for the second time, the shutter will cock and a distinct click will be heard.

(2) SECOND STEP.—With a jeweler's screw driver, push in the safety latch (2, figure 22) above the upper left corner of the back frame and turn the safety control driving shaft assembly (1, figure 22) with the thumb until a click is heard. During the course of turning the driving shaft assembly, the exposure counter dial will advance to the next number.

(3) THIRD STEP.—Again holding the safety latch in, turn the winding key knob until it locks. This will require only a fraction of a turn.

(4) FOURTH STEP.—Push down on the trigger button. This will release the shutter and enable the cycle to be repeated.

b. MECHANICS OF THE WINDING CYCLE. (See figure 28.)—Proper adjustment of the camera requires a thorough understanding of the way the mechanism functions during the winding cycle. When the range finder plate is removed as shown in figure 28, the movement of the various parts can be observed. The cycle discussed in paragraph 3.a., this section, can now be analyzed as follows:

CAUTION

Whenever the winding cycle is followed through with the range finder plate removed from the camera, it is extremely important to observe three precautions: first, the focusing tube assembly must be fully extended; second, the vertical slot in the trigger button (11) must face toward the left front corner of the camera case at all times; and third, the lower (unbroken) edge of the range finder couplet bar (15, figure 22) must be in the slot between the range finder adjusting screw (16, figure 22) and the range finder adjusting screw lock stud (18, figure 22).

(1) FIRST STEP.

(a) As the winding key knob is turned, the key post gear (6, figure 29) is turned by the pin on the key complete (7, figure 29). The key post gear turns the shutter setting gear assembly (25). The shutter setting gear assembly is keyed to the shutter setting gear shaft assembly (3, figure 22), which extends through the mechanism plate. Underneath the mechanism plate the roller on the shaft assembly makes contact with the shutter setting blade assembly (4, figure 22) and as the shaft is rotated, forces the shutter setting blade assembly over to the right and cocks the shutter. On cameras of type A the shutter setting blade assembly makes direct contact with the shutter operating lever (5, figure 21), while on cameras of types B and C, the shutter setting blade assembly bears against the left shutter operating lever lug (9, figure 21), which in turn bears against the shutter operating lever and end assembly (13, figure 21).

(b) As the winding key knob is turned beyond the point where the shutter is cocked, the roller on the shutter setting gear shaft assembly (3, figure 22) moves back toward the key knob and the shutter setting blade assembly (4, figure 22) is returned to its original position by the shutter setting guide spring (20), which is looped over the pin on the shutter setting blade assembly which extends through the mechanism plate and the shutter setting lever light guard (19) on top of the mechanism plate.

(c) When the shutter setting gear assembly (25) has turned until the cut-out portion of the gear is next to the key post gear (6, figure 29), the shutter setting gear spring (23) pulls the gear around and locks it against the shutter setting gear stop lever (4), which is pulled toward the shutter setting gear assembly by the shutter setting stop lever spring (21). The locking is done by means of the stud which projects downward from the shutter setting gear assembly and the projecting lug on the shutter setting gear stop lever. The cut-out portion of the shutter setting gear is still next to the key post gear, so that until the shutter setting gear stop lever is moved out of the way by the safety lever assembly (2) later in the cycle, the winding key knob can be turned without turning the shutter setting gear assembly. This position of the mechanism is the one illustrated in figure 28.

(2) SECOND STEP.

(a) When the safety latch (27) is pushed in and the safety control driving shaft assembly (1, figure 22) is turned with the thumb, the safety control gear (31) on the top of the safety control driving shaft also turns. The safety control idler gear (28), no longer locked by the safety latch, turns and transmits the

action of the safety control driving shaft to the gear on the safety control cam complete (32). The gear turns until the slot in the disc just above the gear is opposite the left end of the safety lever assembly (2). The safety lever assembly is under tension from the safety lever spring (1) and at this point the spring will pull the upper prong on the left end of the safety lever assembly into the slot. The safety control driving shaft assembly will now stop turning unless it is forced.

(b) With film in the camera, the top edge of the back makes contact with the safety latch, holding it in, and the safety control driving shaft assembly is turned by the film as the film is drawn past by the winding key knob. Thus, in actual use of the camera, the second part of the operating cycle overlaps the first part of the cycle and the prong on the safety lever assembly falls into the slot shortly after the shutter is cocked.

(3) THIRD STEP.

(a) When the safety latch (27) is again held in and the winding key knob is turned, the lower prong on the left end of the safety lever assembly (2) is engaged between teeth of the key post gear (6, figure 29). Turning the winding key knob now forces the safety lever assembly toward the right. As the safety lever moves, the right end pushes the trigger lock spring (13) out of the slot in the trigger button (11).

(b) At the same time the black spring on the left end of the safety lever assembly moves up past the first step on the safety lever spring stop plate (5) and locks on the second step.

(c) Also at the same time, the second stud from the left end of the safety lever assembly pushes the shutter setting gear stop lever (4) away from the stud on the shutter setting gear assembly (25). This allows the shutter setting gear spring (23) to pull the shutter setting gear around so that the stud is on the other side of the projecting lug on the stop lever. The first gear tooth after the cut-out portion is now engaged with the key post gear, and the shutter setting gear is in position to turn and cock the shutter when the cycle is repeated.

(4) FOURTH STEP.

(a) When the trigger button (11) is pushed down, the lower end bears against the trigger bell crank underneath the mechanism plate. As the lower end of the bell crank is forced downward, the stud on the upper end of the bell crank forces the trigger plate (7, figure 22) to the left and downward, releasing the shutter. On cameras of type A, the trigger plate makes direct contact with the shutter operating lever (5, figure 21), while on cameras of types B and C, the trigger plate bears against the right shutter operating lever lug (11, figure 21) or the right shutter operating lever lug assembly (18, figure 21), which in turn bears against the shutter operating lever and end assembly (13, figure 21).

(b) As the trigger plate moves to the left, the vertical edge of the plate which extends up through the mechanism plate bears against the longer end of the trigger plate bell crank (16), forcing the shorter end of the trigger plate bell crank against the safety lever assembly near the right end. Since the safety lever assembly is mounted on one pivot stud, the left end moves in the opposite direction, and as the black spring on the safety lever assembly slips past the second step on the safety lever spring stop plate (5), the safety lever spring (1), assisted by the trigger lock spring (13), pulls the whole safety lever assembly back to the left. In a properly adjusted camera, the black spring on the safety lever assembly slips off the second step on the safety lever spring stop plate at the exact instant the shutter is released.

(c) As pressure on the trigger button is relaxed, the trigger plate spring (12) pulls the trigger plate back to its original position and the trigger lock spring (13), no longer held out by the safety lever assembly, drops into the slot in the trigger button and prevents it from being depressed again until the cycle is repeated and the safety lever assembly again pushes the spring out.

4. INSPECTION.

a. Discard all obviously broken, damaged, or strained parts.

b. Inspect all screws for thread condition and discard any with badly burred heads.

c. Make sure that all gears and pinions are free from burrs or broken teeth.

d. Inspect all exterior parts for burrs, chipping, or fractures, and replace any parts necessary.

5. REPAIR.

a. SHUTTER.

(1) GENERAL.

(a) If any of the parts of the shutter shows any evidence of grease or oil, wash it carefully in carbon tetrachloride.

WARNING

Carbon tetrachloride is a volatile solvent. Use it with adequate ventilation. Avoid frequent or prolonged breathing of the vapors.

(b) In the case of the gears, shutter blades, diaphragm wings, and diaphragm retainer plate, use

powdered graphite on the parts; work them in thoroughly and remove the graphite with a blast of air.

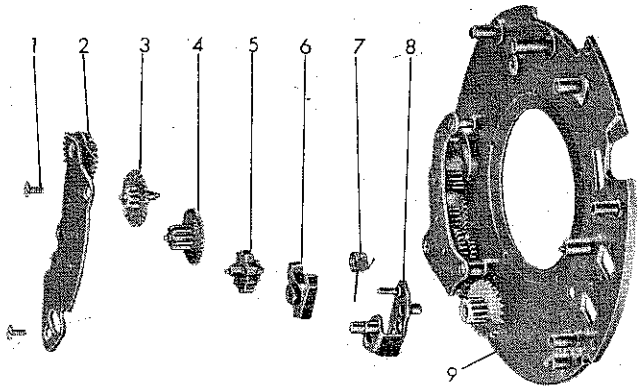


Figure 43—Retard Gear Train, Exploded

Index No.	Nomenclature
1	Gear plate screw
2	Retard plate with No. 1 pinion assembled
3	No. 2 pinion for retard with gear assembled
4	No. 3 pinion for retard with gear assembled
5	No. 4 escapement wheel and pinion assembly for retard
6	Retard pallet
7	Pallet bracket spring
8	Pallet bracket with studs assembled
9	Mechanism plate with studs and delayed action gears assembled

(2) RETARD GEAR TRAIN. (See figure 43.)

(a) If the retard gears are dirty, causing the low speeds to be too slow, or if it is necessary to replace any of the retard gears, remove the two gear plate screws (1) and lift off the retard gear plate with No. 1 pinion assembled (2), exposing the retard gear train. Remove the various parts of the train, which, starting at the end of the retard gear plate having the pinion assembled to it, are as follows:

1. No. 2 pinion for retard with gear assembled (3).

2. No. 3 pinion for retard with gear assembled (4).

3. No. 4 escapement wheel and pinion assembly for retard (5).

4. Retard pallet (6).

5. Pallet bracket with studs assembled (8). The pallet bracket spring (7) will come off with the pallet bracket.

(b) Clean all the parts of the retard gear train in carbon tetrachloride, dry them thoroughly, and immediately reassemble them on the mechanism plate.

WARNING

Carbon tetrachloride is a volatile solvent. Use it with adequate ventilation. Avoid frequent or prolonged breathing of the vapors.

NOTE

If it is necessary to replace any of the gears, replace the entire gear train up to the retard pallet (6). This will include the retarding sector with stud (6, figure 37) and the retard gear plate with No. 1 pinion assembled (2).

(c) In reassembling the gear train, place the short end of the pallet bracket spring (7) toward the mechanism plate and inside the pallet bracket (8), allowing the longer end of the spring at the top to extend out toward the edge of the mechanism plate. Bear in mind that, from the retarding sector end of the train, each gear works into a smaller pinion. After fitting the retard pallet (6) over the stud on the pallet bracket (8), replace the No. 4 escapement wheel and pinion assembly for retard (5) with the pinion underneath. The No. 2 pinion for retard with gear assembled (3) and the No. 3 pinion for retard with gear assembled (4) can be distinguished by the much longer pinion on the latter assembly. Both assemblies should be replaced with the pinion up. Replace the retard gear plate with No. 1 pinion assembled (2), and after making sure that the gears do not bind, fasten it with the two gear plate screws (1). Then lift the longer end of the pallet bracket spring (7) over the spring stud on the mechanism plate, and allow it to rest against the inner edge of the spring groove on the stud.

(d) After reassembling the gear train, temporarily replace the retarding sector with stud (6, figure 37) and the retarding sector screw (4, figure 37), and sprinkle powdered graphite over the gears and pinions. Also rub a small amount of powdered graphite over the top of the retard gear plate so that it will reach the gear bearings. Work the train in thoroughly, and then blow out the graphite with a blast of air.

(3) DELAYED ACTION GEAR TRAIN. (See figure 44.)

(a) If the delayed action gear train is dirty and therefore is slow or sticks, or if it is necessary to replace any of the delayed action gears, remove the two gear plate screws (1) and lift off the delayed action gear plate with stud assembled (2). Remove the parts of the delayed action gear train, which, starting at the end opposite the pallet, are as follows:

1. No. 3 gear with No. 3 pinion (3).

2. No. 4 gear with No. 4 pinion (4).

3. No. 5 gear with No. 5 pinion (5).

4. No. 6 escapement wheel and pinion assembly for delayed action (6).

5. Pallet with pivot (7).

(b) Clean all the parts of the delayed action

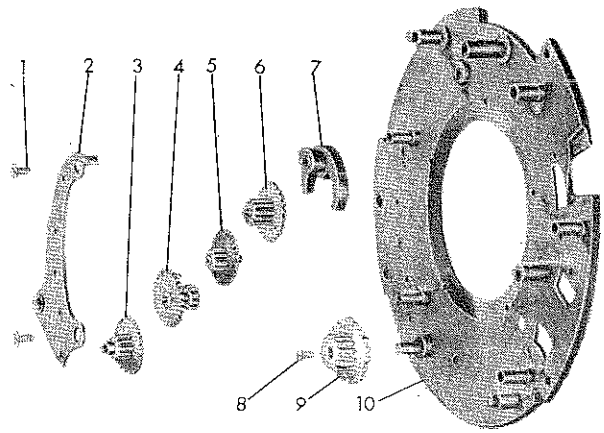


Figure 44—Delayed Action Gear Train, Exploded

Index No.	Nomenclature
1	Gear plate screw
2	Delayed action gear plate with stud assembled
3	No. 3 gear with No. 3 pinion
4	No. 4 gear with No. 4 pinion
5	No. 5 gear with No. 5 pinion
6	No. 6 escapement wheel and pinion assembly for delayed action
7	Pallet with pivot
8	Clutch screw
9	Clutch assembly
10	Mechanism plate with studs

gear train in carbon tetrachloride, dry them thoroughly, and immediately reassemble them on the mechanism plate.

WARNING

Carbon tetrachloride is a volatile solvent. Use it with adequate ventilation. Avoid frequent or prolonged breathing of the vapors.

(c) In reassembling the gear train, remember that, starting at the end opposite the pallet, each gear works into a smaller pinion. First replace the pallet with pivot (7) and then the No. 6 escapement wheel and pinion assembly for delayed action (6), which can be distinguished easily by the shape of the teeth on the wheel. The No. 5 gear with No. 5 pinion (5) is the only assembly with the gear near the center of the shaft. Replace this assembly with the pinion up. The No. 4 gear with No. 4 pinion (4) is the only assembly with the gear at one end of the shaft and the pinion at the other end. Replace this assembly with the pinion down. The No. 3 gear with No. 3 pinion (3) is similar to the No. 6 escapement wheel and pinion assembly except for the shape of the teeth; replace this assembly with the pinion up. Then replace the delayed action gear plate with stud assembled (2), and after making sure that the gears do not bind, fasten it with the two gear plate screws (1).

(d) After reassembling the delayed action gear train, sprinkle powdered graphite over the gears and pinions. Also rub a small amount of powdered graphite over the top of the retard gear plate so that it will reach the gear bearings. Work the train in thoroughly and then blow out the graphite with a blast of air.

(4) BLADE CONTROLLER LATCH. (See figure 45.)—If the shutter blades rebound and leave a small opening when closing, the blade controller latch on the latch with main drive bushing and disc assembled with stud is not properly holding the projecting lever on the blade controller. Reshape the latch at point A to hold the lever of the blade controller tightly against the mechanism plate when the blades are closed. Be sure the opening in the latch is not closed too far. The lever on the blade controller should fit freely into the end of the groove at point B. If the lever binds at this point, the edge of the latch should be filed slightly at point C.

(5) BULB LEVER. (See figure 36.)

(a) If the shutter works instantaneously when set on bulb, the tension on the bulb lever spring (20) may be weak. Increase the tension on the spring by bending the hooked end toward the case. If necessary, replace the spring.

(b) Failure of the shutter to operate properly on "B" may also be caused by improper adjustment of the lug on the side of the trigger. If the lug is bent too far toward the main drive, it will prevent the end of the bulb lever from stopping the disc on the latch with main drive bushing and disc assembled with stud (4), because the bulb lever will not be allowed to move far enough in toward the disc. To correct this trouble, bend the lug out slightly so that it allows full motion of the bulb lever toward the disc.

(6) DELAYED ACTION TRIGGER LATCH.—If the delayed action winding lever (12, figure 33) does not hold after it has been set, the lug on the delayed action trigger latch (13, figure 34) which extends down into the case is slipping past the pivot on the pallet with pivot (7, figure 44). Reshape the lug on the trigger latch until it comes in contact with the pivot and holds the pallet so that the delayed action gears cannot move.

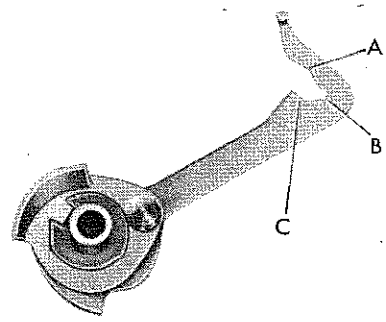


Figure 45—Latch with Main Drive Bushing and Disc Assembled with Stud

(7) DELAYED ACTION TRIGGER LATCH SPRING.—If the blades open when the trigger is released with the delayed action winding lever set, the trouble is probably due to insufficient tension on the delayed action trigger latch spring (12, figure 34). Turn the delayed action trigger latch spring screw (10, figure 34) a quarter turn counterclockwise. Remove the spring from the trigger latch, and holding the spring against the collar in the center of the cover, tighten the spring screw. Replace the spring in its proper position on the trigger latch.

(8) COVER COMPLETE.—If the speed control ring with pointers assembled (10, figure 33) has been forced and passes the stop on 400 speed, use a pair of pliers to take hold of the projecting lug on the outside edge of the delayed action pinion bracket on the cover complete. Bend the lug as required to make the stop on the speed control ring strike solidly against it at the 400 marking.

(9) SPEED CONTROL RING TENSION SPRING.—If the speed control ring with pointers assembled (10, figure 33) is loose, the tension on the speed control ring tension spring (6, figure 33) is probably too low. Bend the spring so that the convex side bears harder against the speed control ring.

(10) REPLACEMENT OF SPEED AND DIAPHRAGM INDEX PLATE OR DIAPHRAGM CONTROL RING RETAINER.

(a) If either the speed and diaphragm index plate (E.K.Co. Part No. 78956) or the diaphragm control ring retainer (E.K.Co. Part No. 78957) on a shutter from a camera of type A has been damaged and requires replacement, it is necessary to replace both parts and also the cover complete (E.K.Co. Part No. 80922R). The speed and diaphragm index plate must be replaced by a speed and diaphragm index plate (E.K.Co. Part No. 95023) and the cover complete (E.K.Co. Part No. 80922R) must be replaced by a special repair assembly, cover complete (E.K.Co. Part No. 98368); the diaphragm control ring retainer should be replaced with a diaphragm control ring retainer (E.K.Co. Part No. 95024). When these new parts are used, two speed index plate anchor stud screws (E.K.Co. Part No. 93298) will also be required to fasten the speed and diaphragm index plate.

(b) If either the speed and diaphragm index plate (E.K.Co. Part No. 95023) or the diaphragm control ring retainer (E.K.Co. Part No. 95024) on a shutter from a camera of type B or type C has been damaged and requires replacement, replace both parts.

(11) DIAPHRAGM CONTROL RING SPRINGS. (See figure 33.)

(a) On shutters from cameras of types B and C, two diaphragm control ring springs (2) are used to eliminate side play in the diaphragm control ring with pointer assembled (8). If there is too much side play in the diaphragm control ring on a shutter of this type, simply bend the springs so that they have greater tension against the speed and diaphragm index plate (9). When reassembling the springs, be sure to turn their convex sides toward the center of the shutter.

(b) If the diaphragm control ring with pointer assembled (8) on a shutter from a camera of type A is replaced with a new assembly, add to the shutter the two diaphragm control ring springs (2) discussed in subparagraph (a) above.

(12) DIAPHRAGM CONTROL RING RETAINER. (See figure 33.)

(a) If the diaphragm control ring with pointer assembled (8) turns too easily, bend the diaphragm control ring retainer (7) with the fingers so that the inner edge is higher than the outer edge. Then when the retainer is fastened in place, the outer edge will bear against the diaphragm control ring with greater tension and the diaphragm control ring will not turn so easily.

(b) If it is necessary to replace the diaphragm control ring retainer, refer to paragraph 5.a.(10), this section.

(13) ADJUSTING SHUTTER SPEEDS.

(a) Shutter testing equipment is necessary for the precise adjustment of shutter speeds. If no special equipment is available, time the 1 second speed with a stop watch and judge the other speeds as well as possible with a shutter known to be in good adjustment.

1. If 1 second is slow and all the speeds are slow, the main drive spring (2, figure 36) has lost some of its tension and should be replaced. Also check to make sure that the blades are not binding. Refer to paragraph 6.b.(1), this section.

2. If 1 second and all of the low speeds (red scale) are slow but the high speeds (black scale) appear to be correct, the retard gear train is probably dirty and slowing up the speeds on which it is engaged. Refer to paragraph 5.a.(2), this section.

3. If 1 second and all of the low speeds are fast, the retarding sector with stud (9, figure 36) may be incorrectly meshed so that the full motion of the retard gear train is not obtained; refer to paragraph 6.b.(2)(k), this section.

(b) Uneven shutter speeds (for example 25, 50, and 200 are correct but 100 is fast or slow) can be corrected only if special shutter testing equipment is available. To adjust a speed, file or swedge the speed

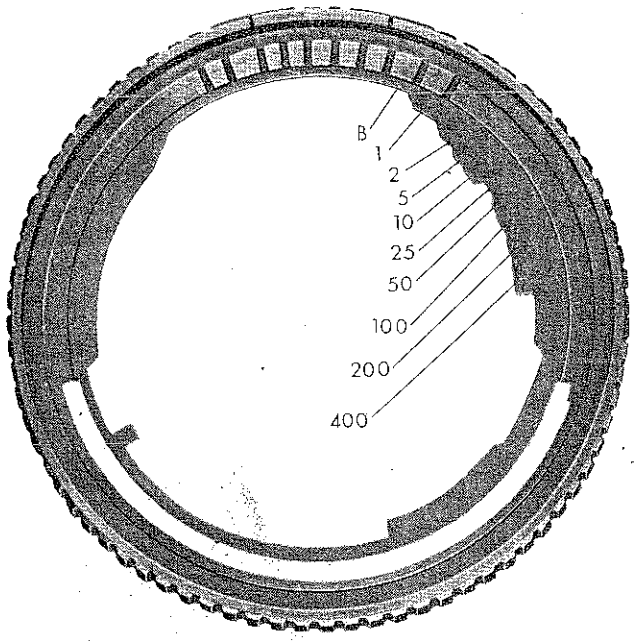


Figure 46—Speed Control Ring with Pointers Assembled

control ring with pointers assembled at the proper point as shown in figure 46. Filing slows the speed while swedging speeds it up.

b. CAMERA CASE AND ASSOCIATED PARTS.

(1) TRIPOD NUT. (See figure 31.)

(a) If the threads have been stripped from the tripod nut (12), remove the bottom plate covered (20) as described in paragraph 2.m.(3), this section.

NOTE

It is not necessary to remove the shutter, focusing tube assembly, or focusing tube guide assembly.

(b) Using a punch with a head approximately 1/32 inch in diameter, knock out the old tripod nut from inside the case. To do this, rest the case on a block of wood with a hole slightly larger than the tripod nut drilled in it.

(c) Place a new tripod nut in position, and with the case resting on a flat metal block, turn over the flange which holds the tripod nut in position. This is conveniently done by using a screw driver with a blade about 1/8 inch wide ground down so that the end is about 1/32 inch thick.

(2) FOCUSING IDLER GEAR SHAFT. (See figure 31.)—If the threads on the focusing idler gear shaft (22) are burred, causing binding, remove the shaft from the focusing idler gear bracket (18). If the shaft does not come out with finger pressure, support the bracket on a block of wood with a hole drilled in it slightly larger and longer than the focusing idler gear shaft, and knock out the shaft with a small punch. Replace the focusing idler gear shaft with a new part.

c. FOCUSING TUBE ASSEMBLY.—If the inside focusing tube binds in the outside tube, smear the inside focusing tube with any light oil and sprinkle powdered graphite liberally over it. Then work the inside and outside tube together until they turn freely, starting the inside tube on different threads of the outside tube. Clean off the parts of the focusing tube assembly with carbon tetrachloride and reassemble. The same procedure can be followed if the outside focusing tube binds on the focusing tube insert (4, figure 30).

WARNING

Carbon tetrachloride is a volatile solvent. Use it with adequate ventilation. Avoid frequent or prolonged breathing of the vapors.

d. CONVERTING TYPE A CAMERAS TO TYPE C. (See figure 21.)—If a new focusing tube assembly (E.K.Co. Part No. 88364) is installed on a camera of type A, it is necessary to convert the shutter operating mechanism to that on a type C camera. To do this, proceed as follows:

(1) Remove the shutter operating disc bearing nut (E.K.Co. Part No. 78977R) from the back of the shutter and lift off the shutter operating disc assembly (7). Replace these parts with a shutter operating disc (15) and a shutter operating disc bearing nut (E.K.Co. Part No. 78977).

(2) Inside the new focusing tube assembly, install a shutter operating lever and end assembly (13) in place of the shutter operating lever (5). The shutter operating lever and end assembly can be fastened in place with the shutter operating lever stud (8) used on both types of camera, but note that the shutter operating lever spring (3) is omitted on cameras of type C. A guide lug spring (19) is used to perform the same function; refer to subparagraph (4), following.

(3) On the back end of the new focusing tube assembly, install a focusing tube guide assembly (14) in place of the focusing tube guide assembly (6). The inner end of the shutter operating lever and end assembly (13) must extend through the slot in the shutter operating lever slide. Fasten the focusing tube guide assembly at the top (under the shutter operating lever slide) with two focusing tube guide to focusing tube screws (E.K.Co. Part No. 95749). These are used in place of the focusing tube guide plate to tube screws (1). The four focusing tube guide to tube lower screws (4) are the same as those used on the type A camera.

(4) Fasten a focusing tube guide lug assembly (16) to the new focusing tube guide assembly with two

focusing tube guide lug to focusing tube guide screws (17). Hook a guide lug spring (19) over the studs on the guide lug assembly and on the right shutter operating lever lug right (18).

(5) The camera will now be type C as far as the shutter operating mechanism is concerned. Although differences in certain other parts will remain, instructions on adjusting cameras of type C will be generally applicable.

e. MECHANISM PLATE.—The following repairs to the mechanism plate assembly (33, figure 28) can be made only with the mechanism plate removed from the camera.

(1) SHUTTER SETTING BLADE ASSEMBLY. (See figure 22.)

(a) If the shutter setting blade assembly (4) is bent and is binding, remove the guide rod clamping screw (7, figure 28). With a jeweler's screw driver, break the upper guide rod (5) loose at the clamp screw end and push it out through the holes in the mechanism plate.

(b) Remove the three shutter setting blade stud nuts (6). Then remove the range finder actuating lever link nut (12) and the range finder actuating lever link washer (11) on the end of the shutter setting blade assembly which projects toward the trigger button end of the mechanism plate.

(c) If the shutter setting blade assembly cannot be straightened so that it works freely, replace it, fitting the pin on the top of the new assembly through the hole in the shutter setting lever light guard (19, figure 28).

(d) Replace the three shutter setting blade stud nuts (6), the range finder actuating lever link washer (11), and the range finder actuating lever link nut (12).

(e) Put a little powdered graphite on the slide slots of the shutter setting blade assembly and work the blade assembly back and forth to make sure there is no binding. The blade assembly should slide under its own weight as the mechanism plate is tilted. Then blow off the excess graphite and shellac in place the three shutter setting blade stud nuts (6) and the range finder actuating lever link nut (12).

(f) Replace the upper guide rod (5) with the slotted end toward the back of the mechanism plate and fasten it with the guide rod clamping screw (7, figure 28).

(g) Hook the shutter setting guide spring (20, figure 28) over the pin on the shutter setting blade assembly which extends up through the shutter setting lever light guard (19, figure 28).

(2) TRIGGER PLATE AND TRIGGER. (See figure 28.)

(a) If the trigger plate (7, figure 22) is bent, do not attempt to straighten it, but replace it with a new part.

(b) On top of the mechanism plate, release the trigger plate spring (12) where it hooks around the lug on the vertical edge of the trigger plate (10) which projects through the slot in the mechanism plate. The trigger plate is now free and it will drop off the underside of the mechanism plate.

(c) If the trigger button (11) is damaged, release it by pulling back on the trigger lock spring (13). Replace the trigger button with a new part.

(d) Assemble the new trigger plate to the mechanism plate by fitting the hole in the end of the trigger plate over the trigger plate stud on the trigger bell crank assembly with which the lower end of the trigger button makes contact. Then, fitting the projecting vertical edge of the trigger plate through the slot in the mechanism plate, hook the trigger plate spring (12) over the lug near the trigger button.

NOTE

In some cases, it may be necessary to ream out the hole in the end of the trigger plate in order to make it fit over the trigger plate stud without binding. The trigger plate should fit snugly but must turn perfectly freely on the stud.

f. ADJUSTING SYNCHRONIZATION.

(1) DEFINITION OF SYNCHRONIZATION.—Synchronizing the camera means adjusting it so that the shutter and the winding mechanism are released simultaneously in the fourth step of the operating cycle. Refer to section VI, paragraph 3. In a properly adjusted camera, the black spring on the safety lever assembly (2, figure 28) slips off the second step on the safety lever spring stop plate (5, figure 28) at the exact instant the shutter is released.

(2) IMPORTANCE OF PROPER SYNCHRONIZATION.

(a) If the shutter is released before the black spring on the safety lever assembly slips off, the photographer will hear the click and may fail to push the trigger button down far enough to unlock the winding mechanism. Then, when he tries to turn the winding key knob, he will find that it is locked. If he forces the knob, damage to the winding mechanism will result.

(b) If the black spring on the safety lever assembly slips off before the shutter is released, the

photographer will hear the click and think that the shutter has been released. He can turn the winding key knob because the winding mechanism has been released, but that frame of film will be blank.

(3) TESTING SYNCHRONIZATION.—Whenever the synchronization is in doubt, it must be checked in the following three ways before it can be assumed to be in correct adjustment.

(a) First check the synchronization by following through the winding cycle with the focusing tube assembly extended to the infinity position. If the focusing scale has been removed from the camera, the infinity position can be located by observing the trigger plate (7, figure 22) as the trigger button is slowly depressed. The left rear corner of the trigger plate is beveled off and the focusing tube assembly is approximately at infinity when it is extended so that the rear edge of the shutter operating lever (5, figure 21) on a camera of type A is just beyond the bevel. On a camera of type B or type C, the right shutter operating lever lug (11, figure 21) or the right shutter operating lever lug assembly (18, figure 21) should be just beyond the bevel. If the camera is not properly synchronized with the focusing tube assembly in the infinity position, adjust it as described in paragraph 5.f.(4), following.

(b) When synchronization is perfect at the infinity position, extend the focusing tube assembly to the limit of travel and again check synchronization. If the shutter is now released later than the winding mechanism, the trigger plate does not extend quite so far to the left at the front as it does at the back. To correct this trouble, use special tool No. 501-I to grasp the trigger plate where the vertical section of the plate extends through the slot in the range finder couplet bar (15, figure 22). Bend the trigger plate just enough to synchronize the camera at the fully extended (3½-foot) position of the focusing tube assembly. Then recheck the synchronization at the infinity position.

CAUTION

Only a very slight bending of the trigger plate is required. Be careful not to use excessive force.

(c) When synchronization is perfect at both the infinity and 3½-foot positions, cock the shutter with the shutter setting lever pin and lever assembly (15, figure 27). This lever moves the black spring on the safety lever assembly up until it locks on the first instead of the second step on the safety lever spring stop plate (5, figure 28). Then slowly depress the trigger button. If the black spring on the safety lever assembly does not slip off the first step at the exact instant the shutter is released, adjust the safety lever spring stop plate as described in paragraph 5.f.(6), following.

NOTE

If the range finder plate is off the camera, the shutter setting lever pin and lever assembly can be used by holding it down over the bushing which holds the shutter setting lever light guard (19, figure 28) in place. The wider prong should be to the left of the pin on the shutter setting blade assembly (4, figure 22) which extends through the mechanism plate and through the shutter setting lever light guard.

(4) ADJUSTING SYNCHRONIZATION WITH THE SHUTTER OPERATING LEVER OR THE RIGHT SHUTTER OPERATING LEVER LUG. (See figure 21.)—If the synchronization is only slightly off, it can be adjusted by bending the shutter operating lever (5) on a camera of type A, or by moving the right shutter operating lever lug (11) or right shutter operating lever lug assembly (18) on a camera of type B or type C. These adjustments can be made with the range finder plate on the camera.

CAUTION

In all synchronization work, a slight adjustment is usually all that is required. Do not overdo the corrective treatment.

(a) ADJUSTING CAMERAS OF TYPE A.

1. If the shutter is released too soon, bend the back end of the shutter operating lever (5) to the left; if the shutter is released too late, bend the back end of the lever to the right. To remove the shutter operating lever for adjustment, unscrew the shutter operating lever stud (8), lift out the shutter operating lever spring (3), and work the shutter operating lever out. On reassembly, replace the shutter operating lever first. Then insert the short end of the shutter operating lever spring under the end of the shutter operating lever bracket toward the winding knob end of the camera, hook the long end of the spring over the shutter operating lever, and replace the shutter operating lever stud.

CAUTION

Do not bend the back end of the shutter operating lever so far to the right that the trigger plate fails to make solid contact with the lever when the trigger button is pushed down. If only the bottom edge of the trigger plate touches the lever, the plate may slip over the top of the lever and get jammed between it and the bottom surface of the mechanism plate. Also, if the shutter operat-

ing lever is bent too far to the right, it may be impossible for the shutter setting blade assembly (4, figure 22) to cock the shutter. In some cases, if the shutter is almost but not quite cocked, the blades may open and close as the winding key knob is turned. To correct the trouble, remove the shutter operating lever again and swedge the left edge of the back end to make it extend farther to the left where the shutter setting blade makes contact. This will make the front end of the lever move farther over to the left and cock the shutter completely. Do not, on the other hand, bend the back end of the shutter operating lever so far to the left that the trigger plate barely reaches far enough over to release the shutter; in this case the shutter blades may fail to remain open when the trigger button is in the time exposure position.

3. If it is not possible to obtain proper synchronization of the camera by bending the shutter operating lever, adjust the black spring on the safety lever assembly as described in paragraph 5.f.(5), following.

(b) ADJUSTING CAMERAS OF TYPES B AND C.

1. Loosen the lower operating lever lug screw (12) and the slide lug screw (10) which hold the right shutter operating lever lug. Move the lug to the right to release the shutter sooner or to the left to release it later. After tightening the screws, shellac the heads to prevent them from working loose.

CAUTION

Do not move the shutter operating lever lug so far to the right that the trigger plate fails to make solid contact with the lug when the trigger button is pushed down. If only the bottom edge of the trigger plate touches the lug, the plate may slip over the top of the lug and get jammed between it and the bottom surface of the mechanism plate. Do not, on the other hand, move the lug so far to the left that the trigger plate barely reaches far enough over to release the shutter; in this case the shutter blades may fail to remain open when the trigger button is in the time exposure position.

2. If it is not possible to obtain proper synchronization of the camera by moving the right shutter operating lever lug, adjust the black spring on the safety lever assembly as described in paragraph 5.f.(5), following.

(5) ADJUSTING SYNCHRONIZATION WITH THE SPRING ON THE SAFETY LEVER ASSEMBLY.—If it is not possible to obtain sufficient adjustment of the synchronization by bending the shutter operating lever on a camera of type A or moving the right shutter operating lever lug on a camera of type B or type C, it is necessary to adjust the black spring on the safety lever assembly. This adjustment can only be made with the range finder plate removed from the camera. If the spring is slipping off the second step on the safety lever spring stop plate (5, figure 28) before the shutter is released, use a pair of flat-nosed pliers to bend it toward the safety lever, while if the spring hangs on the step too long, bend it away from the safety lever.

(6) ADJUSTING THE SAFETY LEVER SPRING STOP PLATE. (See figure 28.)

(a) If the camera is perfectly synchronized for normal operation but is not releasing properly when the shutter has been cocked with the manual shutter setting lever pin and lever assembly, the trouble can only be eliminated by adjusting the safety lever spring stop plate (5).

(b) If only a very slight adjustment is required, insert the blade of a screw driver between the side of the stop plate and the mechanism plate. Force the stop plate slightly until the black spring drops off either the first or second step at the exact instant the shutter is released. Make certain that the two safety lever spring stop plate to mechanism plate screws (6) are tight and shellac the screw heads to prevent any possible movement of the stop plate. Then recheck the synchronization at all points as described in paragraph 5.f.(3), preceding.

(c) If anything more than a very slight adjustment of the safety lever spring stop plate is required, remove the safety lever assembly as described in paragraph 2.i., this section, and scribe around the stop plate to record its position. Then remove the two safety lever spring stop plate to mechanism plate screws (6) and pry up the stop plate. Remove and discard the safety lever stop plate dowel (3). Put shellac under the stop plate and replace it in the same position it occupied before, using the scribed lines as a guide. Replace the two safety lever spring stop plate to mechanism plate screws and replace the safety lever assembly as described in paragraph 6.g.(8), this section. Now, by inserting the blade of a screw driver between the side of the stop plate and the mechanism plate, move the stop plate as required to make the black spring on the safety lever assembly drop off either the first or second step at the exact instant the shutter is released. Make certain that the two safety lever spring stop plate to mechanism

plate screws are tight and shellac the screw heads to prevent any possible movement of the stop plate. Then recheck the synchronization at all points as described in paragraph 5.f.(3), preceding.

g. ADJUSTING THE COCKING OF THE SHUTTER. (See figure 21.)

(1) On cameras of type A, the cocking of the shutter is closely related to the synchronization of the camera. If the back end of the shutter operating lever (5) is bent too far to the right in an effort to speed up the release of the shutter when the trigger button is depressed, the front end of the shutter operating lever may not travel far enough to the left to cock the shutter. Refer to paragraph 5.f.(4)(a), this section. If the shutter operating lever cannot be swedged sufficiently to correct this difficulty, bend the back end of the shutter operating lever far enough to the left to make the lever cock the shutter positively and completely. Then adjust the synchronization with the spring on the safety lever assembly as described in paragraph 5.f.(5), this section.

CAUTION

Do not bend the back end of the shutter operating lever so far to the left that the front end of the lever will be forced beyond the point at which it cocks the shutter. If this happens, the winding key knob will turn hard when the shutter is being cocked.

(2) On cameras of types B and C, the cocking of the shutter is controlled by the adjustment of the left shutter operating lever lug (9). If the front end of the shutter operating lever and end assembly (13) is not moving far enough to the left to cock the shutter completely, loosen the lower operating lever lug screw (12) and the slide lug screw (10) which hold the left shutter operating lever lug. Move the lug a little farther to the left and tighten the screws. After checking the adjustment by following through the winding cycle as described in section VI, paragraph 3, shellac the heads of the screws to prevent them from working loose.

CAUTION

Do not move the lug so far to the left that the front end of the shutter operating lever and end assembly will be forced beyond the point at which it cocks the shutter. If this happens, the winding key knob will turn hard when the shutter is being cocked.

h. ADJUSTING THE SAFETY LEVER ASSEMBLY. (See figure 47.)—Correct adjustment of the safety lever assembly is extremely important to proper operation of the camera. Whenever it is necessary to install a new safety lever assembly, fit it to the camera by the following procedure. These instructions should also be consulted if trouble is experienced with the operation of the old safety lever assembly and it is to be adjusted rather than replaced.

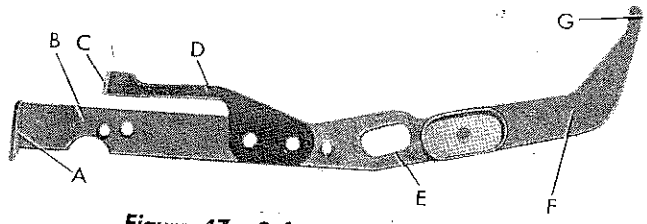


Figure 47—Safety Lever Assembly

(1) Inspect the bottom of the safety lever for burrs. If the surface is not perfectly smooth, use a fine stone to remove any roughness. Also make sure there are no burrs on the end of the spring at (C).

(2) Bend the whole safety lever a little so that point (E) is slightly higher than point (A) or point (G). This will bring the top of the safety lever in contact with the safety lever to plate stud nut (8, figure 28) and prevent any possibility of loose operation of the safety lever.

(3) Bend the black spring down far enough between points (C) and (D) to insure positive engagement of the end of the spring at (C) with the steps on the safety lever spring stop plate (5, figure 28).

(4) If necessary, bend the lever up from point (A) to point (B) in order to raise the top prong sufficiently so that it will clear the gear on the safety control cam complete (32, figure 28). The prong must not touch the teeth of the gear. It may also be necessary to bend the lever slightly toward the back of the camera between points (A) and (B) in order to allow the top prong of the safety lever to make positive contact with the slot in the disc just above the gear.

(5) Bend the safety lever down slightly between points (F) and (G). This will bring the right end of the safety lever down in contact with the mechanism plate so that the trigger lock spring (13, figure 28) cannot slip under the end. If any difficulty is experienced with the trigger lock spring jumping over the top of the safety lever assembly, it may be advisable to make a fine slot in the end of the safety lever at (G) with a knife stone. The slot will form a recess for the spring and prevent it from slipping over the top of the lever.

i. OPTICAL ADJUSTMENTS TO RANGE FINDER. (See figures 27 and 48.)

NOTE

It is preferable to correct optical defects in the range finder system in the order named.

(1) ONE FIELD IS SMALLER THAN THE OTHER.—This condition is due to tilting of the erecting prism forward or backward, usually caused by a severe jar to the camera. The focus of one or both fields may also be affected.

(a) Remove the two range finder eyelet frame screws (5, figure 26) and the parallax frame assembly (7, figure 26). Then fasten the range finder eyelet lens assembly (8, figure 26) in place again with the two range finder eyelet frame screws.

(b) Loosen the erecting prism retaining screws (3) on either side of the erecting and coincidence prism assembly (5); special tool No. 501-C will be found convenient for the right-hand screw. Tilt the prism assembly forward or backward until the dividing line is centered up and down and the two fields are of equal size. After tightening the retaining screws, put a small amount of shellac on the heads to prevent the screws from working loose. On cameras of type C, the erecting prism assembly complete (E.K.Co. Part No. 94752) is separate from the coincidence prism assembly complete (E.K.Co. Part No. 94048), but the method of adjustment is the same.

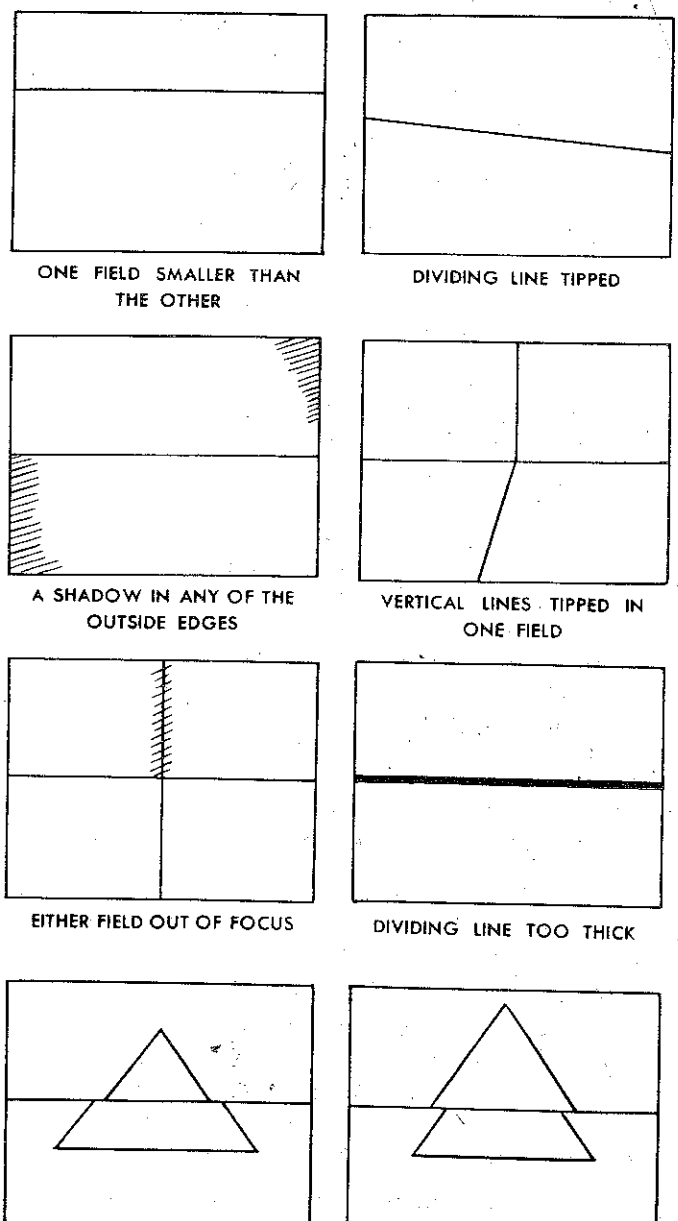

ONE FIELD SMALLER THAN THE OTHER
DIVIDING LINE TIPPED
A SHADOW IN ANY OF THE OUTSIDE EDGES
VERTICAL LINES TIPPED IN ONE FIELD
EITHER FIELD OUT OF FOCUS
DIVIDING LINE TOO THICK
HALVING INCORRECT
PART OF TRIANGULAR TEST OBJECT MISSING
PART OF TRIANGULAR TEST OBJECT APPEARS IN BOTH FIELDS

Figure 48—Optical Defects in Range Finder

(c) Again remove the two range finder eyelet frame screws (5, figure 26), replace the parallax frame assembly (7, figure 26), and replace the eyelet frame screws.

(2) DIVIDING LINE TIPPED.—This condition is very similar to that described in subparagraph (1), preceding. Instead of tilting forward or backward, the erecting prism has tilted sideways. Make the adjustment in the same manner and be sure to shellac the heads of the retaining screws to prevent recurrence of the trouble.

(3) A SHADOW IN ANY OF THE OUTSIDE EDGES.

(a) A shadow may be due to bending of the range finder reflection guard (18) so that it is cutting into the beam of light. If the reflection guard has not been bent, make sure that the range finder reflection guard screw (17) is tight and is not allowing the guard to slip out of position in any direction. In this case, tighten the screw and shellac the head to prevent it from working loose again.

(b) If no obstruction can be located in the affected beam, the erecting prism may not be perfectly lined up with the coincidence prism. Loosen the two erecting prism retaining screws (3), adjust the erecting prism so that it is the same distance from the coincidence prism at both sides, and tighten and shellac the screws. Refer to subparagraph (1), preceding.

(4) VERTICAL LINES ARE TIPPED IN ONE FIELD.

(a) LINES ARE TIPPED IN LOWER FIELD.—If the lines are tipped clockwise as shown in figure 48, use special tool No. 501-E to tighten the large end prism bracket to mount screw (24). In most cases it will be necessary to tighten the screw only very slightly. If no result is obtained, loosen very slightly the center one of the three smaller end prism bracket to mount screws (26) directly above the large screw. Working the two screws in conjunction with each other, straighten the vertical lines. After making the adjustment, shellac both screw heads. If the lines

are tipped counterclockwise, follow the same general procedure, but tighten the upper screw, and, if necessary, loosen the lower one.

(b) LINES ARE TIPPED IN UPPER FIELD.—If the lines are tipped clockwise, tighten slightly the small end prism bracket to mount screw (14) directly above the large end prism bracket to mount screw (13). If no result is obtained, loosen very slightly the large screw (13) and work the two screws in conjunction with each other to straighten the vertical lines. Then shellac both screw heads. If the lines are tipped counterclockwise, follow the same general procedure, but tighten the lower screw, and, if necessary, loosen the upper one.

NOTE

After an adjustment has been made to correct tipped vertical lines, it will probably be necessary to correct the halving also. Refer to subparagraph (6), following.

(5) EITHER FIELD OUT OF FOCUS.—The focus of each field is controlled by the position of its objective lens mount assembly (2). The left-hand lens mount assembly controls the lower (stationary) field, while the right-hand lens mount assembly controls the upper (movable) field. To make an adjustment, use special tool No. 501-D to loosen the two objective lens mount nuts (1) on the objective lens mount assembly concerned and move it forward or backward until the field is in perfect focus. After making the adjustment, correct the halving as described in subparagraph (6), following, and shellac the nuts to lock them in place.

(6) HALVING IS INCORRECT.—The halving or height adjustment is best tested on a triangular test object. When the halving is incorrect, the sides of the test object will appear to be broken even when the range finder is set for the correct distance. This effect is due to incorrect adjustment of one of the objective lens mount assemblies (2); if there is too much vertical separation between the two lenses a section of the triangle will be missing, while if there is not enough, the same part of the triangle will appear in both fields. See figure 48.

(a) PART OF TRIANGULAR TEST OBJECT MISSING.—Without loosening the objective lens mount nuts (1), gently tap down the right-hand objective lens mount assembly (2) or raise the left-hand objective lens mount assembly by gently prying it up with the blade of a screw driver. When the adjustment is correct, shellac the nuts in place.

NOTE

Neither of the two objective lens mount assemblies should be raised or lowered to the extent that it is not reasonably well centered in its front window on the direct view finder cover assembly (4, figure 23). For this reason, it is advisable to replace the cover assembly temporarily before making the adjustment. The lens assembly which it is preferable to adjust can then be selected on the basis of its centering in the front window.

(b) PART OF TRIANGULAR TEST OBJECT APPEARS IN BOTH FIELDS.—Follow the same general procedure as that given in subparagraph (a), preceding, but raise the right-hand objective lens mount assembly or lower the left-hand objective lens mount assembly.

(7) DIVIDING LINE TOO THICK.

(a) Severe climatic conditions sometimes cause separation of the two triangular coincidence prisms. If this is the case, replace the entire erecting and coincidence prism assembly (5) or, on a camera of type C, the coincidence prism assembly complete (E.K.Co. Part No. 94048).

(b) Too thick a dividing line may also be due to incorrect position of the small aligning mask under the view finder mask at the back of the direct view finder cover assembly (4, figure 23). Move the mask up or down until the dividing line is of the desired thickness; then apply a small amount of shellac to the mask to prevent it from slipping out of place.

NOTE

Great care should be taken with this adjustment because it may have a tendency to affect the clarity and brightness of both fields.

6. REASSEMBLY.

a. REASSEMBLY OF BACK COMPLETE. (See figure 42.)

(1) Place the two hinge latches (12) in position, one at each end of the back, and fasten them with the two hinge to latch screws.

(2) Place the two hinge pin springs and the four hinge pins (13) in position and hold them in place with the hinge latches (12) at either end of the back. The hinge pins must be turned so that the holes are in position to receive the hinge grips (14).

(3) Using adhesive tape to protect the finish on the hinges, force the four hinge grips (14) into place with a pair of blunt-nosed pliers.

(4) Replace the two hinge grip guides (15), one at each end of the back, and fasten them with the four hinge grip guide screws (9).

(5) Replace the film roller pin spring (7) in the open end of the back film roller (8) and insert the film roller pin (6) with the small end turned out. Put the solid end of the film roller in the bearing hole at the left bottom corner of the back; then, with a small screw driver, push the film roller pin far enough into the roller to allow the small end of the pin to be engaged in the bearing hole at the top of the back.

(6) If the window slide button (11) was disassembled from the back, place the window slide (10) in place with a new window slide button (11) extending through it. Rest the back on a metal block covered with adhesive tape to protect the finish on the outer end of the window slide button, and turn over the inner end of the button with a small hammer.

(7) With the window slide (10) covering the round hole through the back, slide the window slide spring (5) under the window slide with the straight end resting against the nearer side of the window slide button (11) and the curved portion of the spring over the spring stud. Push the short end of the spring down so that it rests against the side of the recess provided for the spring.

(8) Replace the window slide cover assembly (4) and fasten it with the seven window cover to back screws (3).

(9) Replace the film tension pad assembly (2) with the large hole over the film window and fasten it with the two tension pad to back screws (1).

b. REASSEMBLY OF SHUTTER.

(1) MECHANISM PLATE.

(a) Turn the mechanism plate with studs, delayed action gears, and retard assembly (1, figure 41) so that the gears are underneath, and sprinkle a little powdered graphite on the groove for the blade controller (2, figure 41) which surrounds the central opening. Also sprinkle a little graphite on the surface of the blade controller which comes in contact with the mechanism plate. Replace the blade controller, fitting the projecting lug through the opening in the mechanism plate through which the No. 1 retard pinion can be seen. Work the blade controller in thoroughly; then take it off the mechanism plate. Blow the graphite off both the mechanism plate and the blade controller and replace the blade controller.

CAUTION

Be very careful not to bend the blade controller during these operations. Bending by rough handling will cause binding and improper operation of the shutter blades.

(b) Before replacing the shutter blades, clean these parts with carbon tetrachloride and dip them in powdered graphite. Holding the blades carefully to avoid bending, rub the graphite over their surfaces with a soft cloth; then blow it off with a blast of air.

WARNING

Carbon tetrachloride is a volatile solvent. Use it with adequate ventilation. Avoid frequent or prolonged breathing of the vapors.

CAUTION

Fingerprints on the blades will cause corrosion. After the blades have been cleaned, handle them with tweezers.

(c) The two blades with double blade bushing and stud (3, figure 41) are very similar in appearance to the three blades with stud (4, figure 41). However, it will be seen on close examination that the stud on a blade with double blade bushing and stud is smaller than either side of the stud on a blade with stud. To reassemble the blades to the mechanism plate, proceed as follows:

1. With the blade controller positioned so that the projecting lug is turned as far as possible toward the retard pallet bracket with studs assembled (8, figure 43), replace a blade with double blade bushing and stud (3, figure 41) with the hole in the blade over the stud on the back of the mechanism plate which is nearest the projecting lug on the blade controller. The stud on the blade must be turned up, and the bushing on the other side of the blade must fit into the cut-out slot on the inner edge of the blade controller. Proceeding counterclockwise around the mechanism plate, replace another blade with double blade bushing and stud in the same manner, allowing the wide end of the second blade to overlap the narrow end of the first.

2. Still proceeding counterclockwise, replace the three blades with stud (4, figure 41), allowing the wide end of each blade to overlap the narrow end of the preceding one.

3. Replace one of the two plain blades (5, figure 41) over the first blade with double blade bushing and stud to be put on, fitting one hole in the blade over the stud on the mechanism plate and the other hole over the stud on the blade with double blade bushing and stud. Then replace the remaining blade over the second blade with double blade bushing and stud to be put on. When this has been done the back of the mechanism plate should appear as shown in figure 49.

(d) Replace the diaphragm retainer plate and wing assembly (6, figure 41) by placing the cut-out slot in the outer edge of the retainer plate over the stud on the pallet bracket with studs assembled (8,

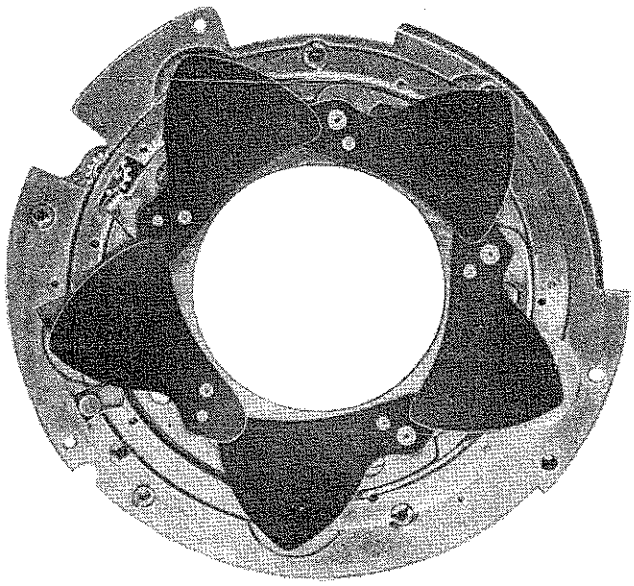


Figure 49—Shutter Blades in Position on Mechanism Plate

figure 43) which extends through the mechanism plate, and then dropping the retainer plate gently on the mechanism plate. Line up the screw holes in the retainer plate with the screw holes in the mechanism plate and replace the five retainer plate screws (7, figure 41).

(e) Turn over the mechanism plate complete (1, figure 40) and move the projecting lug on the blade controller (under the No. 1 retard pinion) back and forth with a jeweler's screw driver. The shutter blades must operate freely with absolutely no binding and with a minimum of friction or drag.

(f) With the shutter blades opened by turning the blade controller toward the retard pallet bracket, close the diaphragm wings and then run the side of a screw driver blade around in the central opening in the mechanism plate. This will open up the diaphragm wings uniformly to the maximum aperture.

(g) Place the diaphragm ring (2, figure 40) in the case with cable release nut (5, figure 40) with the projecting arm lying in the groove in the case opposite the opening at the top of the case. Turn the diaphragm ring clockwise until the arm is at the end of the groove nearer the cable release nut.

(h) Hook the setting lever spring (3, figure 40) through the hole in the shutter setting lever with stop stud (4, figure 40). Then place the shutter setting lever in the case with the setting lever spring extending out through the opening in the case and with the stop stud on the shutter setting lever turned toward the cable release nut until it makes contact with the stop which is machined on the surface of the case. This will bring one end of the shutter setting lever approximately opposite the cable release nut.

(i) After positioning the diaphragm ring and the setting lever, hold the mechanism plate complete (1, figure 40) with the gears on top and line up the screw hole on the edge of the mechanism plate near the bushing for the retarding sector with the corresponding hole in the case. Drop the mechanism plate gently down in the case, and holding the mechanism plate in position with the fingers, turn the case and plate over and insert one of the long plate locating screws (6, figure 40). Now inspect the diaphragm ring (2, figure 40) to see that the circular projections on the ends of the diaphragm wings are in position in the slots in the ring. If they are not, take a jeweler's screw driver and gently push each one that is out of position over into place in its slot. The diaphragm wings should now operate properly when the projecting lever on the diaphragm ring is moved back and forth.

(j) Next check the setting lever with stop stud (4, figure 40) to make sure that it is in proper position to move freely and is not jammed between the mechanism plate and the case. Then insert the remaining long plate locating screw (6, figure 40) through the back of the case into the stud on the delayed action gear plate with stud assembled (2, figure 44). Also insert the short plate screw (7, figure 40) through the back of the case into the hole in the edge of the mechanism plate near the retard pallet bracket.

(2) PARTS ON MECHANISM PLATE. (See figure 36.)

(a) Place the blade controller latch spring (7) with the short end of the spring against the retarding sector stud and the loop over the threaded end of the long plate locating screw (6, figure 40) which extends up through the mechanism plate near the retarding sector stud. Screw the latch spring bushing (5) loosely on the screw. Then, holding the long end of the spring tightly up against the inside wall of the case with a pair of tweezers, tighten down the latch spring bushing so that it holds the spring in place with tension outward toward the case.

(b) Grasp the loose end of the setting lever spring (3, figure 40) with a pair of tweezers and hold it over the spring stud in the case near the delayed action pallet with pivot (7, figure 44). Force the spring down over the stud, making sure that the loop is properly engaged in the groove in the side of the stud. The spring should extend around the cut-out edge of the mechanism plate without riding up over the top.

(c) Replace the clutch assembly (9, figure 44) on the stud near the wide end of the delayed action gear plate with stud assembled (14). Engage the gear teeth with the teeth of the No. 3 pinion and fasten the clutch assembly with the clutch screw (8, figure 44).

(d) Place one bulb lever spacer (2, figure 38) on the bulb lever stud. The bulb lever assembly (1) has a lug projecting from one side near the bushing. With the bulb lever spring (20) underneath, hold the trigger and collar assembled (19) with the oval hole up and insert the bulb lever assembly into the opening on the trigger in such a way that the projecting lug on the bulb lever assembly points toward the round hole in the base of the trigger and sticks out through the rectangular hole in the side of the trigger. Then place the remaining bulb lever spacer (18) between the top of the trigger and the top of the bulb lever assembly and grasp all three parts by inserting one prong of a pair of tweezers down through the center holes. With the hooked end of the bulb lever spring turned in a clockwise direction, guide the parts down over the bulb lever stud. Using a pair of tweezers, insert the hooked end of the bulb lever spring through the small hole in the side of the case.

CAUTION

Do not force these parts in reassembling them because either the trigger or the bulb lever assembly may be damaged by bending.

(e) Place the trigger washer (16) over the round hole in the base of the trigger. Then, holding the trigger spring (15) over the washer with the short end pointing toward the delayed action gear train and the long end pointing toward the central opening in the mechanism plate, replace the trigger screw (17). With a pair of tweezers, lift the long end of the spring over the end of the delayed action gear plate (14) and let it rest against the outside of the stud to which the narrow end of the delayed action gear plate is screwed.

(f) With the main drive spring (2) hooked in the small hole in the disc on the latch with main drive bushing and disc assembled with stud (4), hold the assembly with the latch pointing toward the central opening in the mechanism plate, and fit the bushing down over the main drive stud. Then, holding the case on its side, grasp the assembly with the fingers and lift it up enough to fit the stud on the setting lever with stop stud (4, figure 40) into the slot in the main drive bushing.

(g) Close the shutter blades by pushing in a counterclockwise direction the projecting lever on the blade controller [under the pinion end of the retard gear plate with No. 1 pinion assembled (11)]. Now, pushing the latch gently toward the lever on the blade controller, cock the shutter by pushing the setting lever clockwise. The cut-out portion of the latch will come to rest around the lever on the blade controller. With tweezers, lift up the long end of the blade controller latch spring (7) and place it inside the vertical lug on the tip of the latch. This will bring the latch in close contact with the lever on the blade controller; refer to paragraph 5.a.(4), this section.

(h) Replace the main drive screw (3) and tighten it with pliers.

(i) Trip the shutter by pushing the portion of the trigger and collar assembled (19) which extends into the cut-out part of the case. Then hook the main drive spring (2) on the turned-over end of the delayed action gear plate with stud assembled (14).

(j) Cock the shutter again, and with the long end of the retarding sector spring (6) at the top, replace the retarding sector with stud (9) together with the retarding sector spring on the retarding sector stud. Fasten both parts with the retarding sector screw (8). Then lift up the long end of the retarding sector spring and place it against the inner side of the latch spring bushing (5).

(k) Loosen slightly the two gear plate screws (10) which hold the retard gear plate with No. 1 pinion assembled (11). Then, lifting up on the pinion end of the gear plate until the teeth of the retarding sector with stud (9) can pass freely under the pinion, place the retarding sector with the outer edge approximately 1/32 inch away from the case. Still lifting up on the gear plate, turn the No. 1 gear so that the last tooth before the cut-out portion (proceeding clockwise) is up against the stud on the retarding sector. Engage the retarding sector with the No. 1 pinion in this position by allowing the pinion end of the gear plate to drop down. If the retarding sector does not become engaged, follow though the procedure again, this time placing the outer edge of the retarding sector a little farther from the case. The retarding sector should be engaged in such a position that it is as close as possible to the case; this allows it a full sweep in the operation of the shutter. When the retarding sector is properly adjusted, the shutter will stay open somewhat longer than 1 second if it is tripped at this stage of reassembly.

(l) Replace the No. 1 gear with No. 1 pinion and spring assembled (12), meshing the gear with the pinion on the clutch assembly (9, figure 44), and hook the spring around the stud to which the nearer end of the delayed action gear plate with stud assembled (14) is fastened.

(3) COVER COMPLETE AND ASSOCIATED PARTS. (See figure 34.)

(a) With the shutter in a tripped position, replace the cover complete (7, figure 35) fitting the shaft on the No. 1 gear with No. 1 pinion and spring assembled (9) into the hole in the delayed action pinion bracket on the cover. The projecting lever on

the diaphragm ring (11) must fit through the slot in the cover, and the lug pressed into the edge of the cover must fit into the corresponding cut-out slot in the edge of the case with cable release nut (5, figure 40). Fasten the cover with the two long cover screws (8), one on either side of the slot for the lever on the diaphragm ring, and the short cover screw (3) near the top of the shutter.

(b) Cock the shutter and replace the delayed action trigger latch (13) with the hole over the collar on the trigger and collar assembled (19, figure 36). Fasten it with the delayed action trigger latch screw (1). Hook the end of the delayed action trigger latch spring (12) over the delayed action trigger latch.

(3) PARTS ON FRONT OF SHUTTER. (See figure 33.)

(a) Replace the delayed action winding lever (12) with the sixth or seventh tooth from the left meshed with the No. 1 gear with No. 1 pinion and spring assembled (9, figure 34). Wind the delayed action mechanism by giving three half-strokes on the winding lever, lifting and replacing the lever after the first and second strokes.

CAUTION

In lifting the delayed action winding lever between strokes, be careful not to touch the delayed action trigger latch (13, figure 34), because it will move out toward the case and allow the delayed action gear train to run down.

(b) Trip the shutter, and with the point of a jeweler's screw driver, lightly hold the delayed action winding lever down around the central collar on the cover complete at a point near the delayed action trigger latch (13, figure 34). Note the time required for the delayed action mechanism to release the shutter blades; this should be between 9 and 14 seconds. If the time is longer than 14 seconds or if the delayed action winding spring (8, figure 37) does not have enough tension to pull the delayed action trigger latch (13, figure 34) around and open the shutter blades, wind the spring tighter by giving an additional half-stroke of the winding lever.

CAUTION

Do not wind the spring any tighter than necessary; excessive tension will bend it.

(c) With the shutter in a tripped position, replace the high speed spring (2, figure 35) with the straight end in the hole in the main drive bushing and the end which projects radially resting against the edge of the spring cam cut-out in the cover. Replace the spring cam (2, figure 34) with the projecting part of the outer edge turned downward. In this position the sides of the cam will face the correspondingly shaped edges of the cut-out in the cover.

(d) Replace the shutter retaining ring (11) with the wrench slots turned toward the back of the shutter.

(e) With the shutter still in the tripped position, replace the speed control ring with pointers assembled (10), making sure that the pointers point toward the front of the shutter, that the lever on the diaphragm ring (11, figure 34) projects through the slot in the speed control ring, and that the projecting lug on the bulb lever assembly (1, figure 36) and the studs on the retarding sector with stud (5, figure 34) and the pallet bracket with studs assembled (7, figure 34) are resting against the inside edge of the speed control ring and are not underneath it.

(f) Replace the speed control ring tension spring (6) in the spring groove in the back of the speed and diaphragm index plate (9), if necessary using a very small amount of heavy grease in the spring groove to hold the spring in place while the index plate is being replaced on the shutter. The convex side of the spring should face toward the back of the shutter.

NOTE

If the speed control ring with pointers assembled (10) has been replaced by a new assembly of the type having notches at the top of the front side for click speed stops, use a new speed control ring tension spring (6) in order to have the crimp in the spring which fits into notches and makes the click stops operate.

(g) Replace the speed and diaphragm index plate (9), fitting the holes in the plate over the anchor studs on the cover complete (6, figure 34) and fasten them with the two speed index plate anchor stud screws (5). On shutters from cameras of type A, there is only one anchor stud and the speed and diaphragm index plate (E.K.Co. Part No. 78956) is held in place by the lens adapter (E.K.Co. Part No. 78972) instead of being held by screws. If it is necessary to replace the speed and diaphragm index plate on a shutter from any type of camera, refer to paragraph 5.a.(10), this section.

(h) Replace the diaphragm control ring with pointer assembled (8), fitting the notch opposite the pointer over the projecting lever on the diaphragm ring. Shutters on cameras of types B and C have two diaphragm control ring springs (2) which should be fitted in the longer cut-out portions of the diaphragm control ring with their convex sides pointing inward toward the central opening in the shutter.

(i) Replace the diaphragm control ring retainer (7) with the projecting lug on the inside edge of the retainer in the cut-out notch at the bottom of the speed and diaphragm index plate. Fasten the retainer with the three diaphragm control ring retainer screws (1), being careful not to let the screw driver slip and strike the shutter blades. On shutters from cameras of type A, the diaphragm control ring retainer is held in place by a lens adapter (E.K.Co. Part No. 78972) and adapter lock screw (E.K.Co. Part No. 71485). Screw in the lens adapter and tighten it with special tool No. 501-U (and Handle No. 84); then replace the adapter lock screw.

NOTE

If it is necessary to replace the diaphragm control ring retainer with a new part, replace also the speed and diaphragm index plate. Refer to paragraph 5.a.(10), this section.

(j) Replace the shutter operating disc spacer (1, figure 39) on the back of the shutter case. Some shutters have a lug on the back of the case over which the cut-out on the inner edge of the spacer should fit; if there is no lug, the spacer can be replaced in any position.

(k) Replace the shutter operating disc (2, figure 39) with the projecting lug between the lug on the setting lever with stop stud (4, figure 40) and the trigger, and replace the shutter operating disc bearing nut (3, figure 39). On cameras of type A, replace the shutter operating disc assembly (E.K.Co. Part No. 80916) and the shutter operating disc bearing nut (E.K.Co. Part No. 78977R) in the same manner.

NOTE

If it is necessary to install either a new shutter operating disc or a new shutter operating disc bearing nut on a shutter from a camera of type B or C, replace both parts.

(l) Screw in the rear lens mount with the fingers. No special tool is necessary.

(m) Place the shutter on special tool No. 501-W and screw in the front lens mount together with the adapter ring insert. Tighten the lens mount with special tool No. 501-O, being careful not to tighten the adapter ring insert in the mount.

c. SPOOL HOUSINGS, FOCUSING GEARS, AND SPACERS. (See figure 31.)

(1) Replace the right-hand mechanism plate spacer (9) and fasten it with one of the two case to spacer screws.

(2) With the focusing pinion in the bushing in the front of the case, replace the left-hand mechanism plate spacer (25) with the convex portion toward the left front corner of the case and fasten the spacer with the remaining case to spacer screw.

(3) With the bottom plate covered (20) in position beneath the case, place the spool tension (21) and the two bottom plate to case washers (16) in position over the holes in the bottom of the case with the spool tension at the left. Fasten the bottom plate to the case with the three bottom plate to case screws (17).

(4) With the focusing idler gear (23) on the focusing idler gear shaft (22), replace the focusing idler gear shaft with one end in the hole in the case and the other in the focusing idler gear bracket (18) and fasten the bracket with the two idler gear bracket screws (19).

(5) With the blade of a small screw driver, scrape out the channels in the bottom of the case where the bottom edges of the spool housings are to fit. Apply black wood lacquer dope to the channels.

NOTE

The lacquer dope functions as a filler; wood lacquer dope should therefore be used in preference to metal lacquer dope because it has a higher percentage of solids. If only clear dope is available, add carbon black to it so that no light will be transmitted. If neither clear nor black lacquer dope is available, use regular black wood lacquer without thinning.

(6) Place the left-hand spool housing (24) and the right-hand spool housing assembly (10) in position in the case. Set each housing in its channel by placing a wood or fiber block on top of the spool housing and tapping the block gently.

d. MECHANISM PLATE. (See figure 31.)

(1) With the blade of a small screw driver, scrape out the channels in the bottom of the mechanism plate into which the top edges of the spool housings are to fit. Apply black wood lacquer dope to the tops of the spool housings. Refer to paragraph 6.c.(5), this section.

(2) Place the safety control driving shaft assembly (26) in place in the left end of the case with the tapped end up and the other end in the hole in the case which is nearer the back frame. Also place the right-hand case film roller (5) in place. This roller can be distinguished from the left-hand case film roller (4) by the double shoulder at each end.

(3) Lower the mechanism plate down on the case, fitting the safety control driving shaft and the

right-hand case film roller into the holes in the mechanism plate.

CAUTION

The safety control driving shaft assembly must work freely, and care should be taken not to bend the shaft where it passes through the mechanism plate.

(4) Replace one mechanism plate to spacer screw (3) near the trigger button. This will hold the right end of the mechanism plate down so that the right-hand case film roller (5) will not jump out while the left-hand case film roller (4) is being replaced. Lift up the left end of the mechanism plate enough to slip the left-hand case film roller into the holes in the case and mechanism plate in which it rests. Now replace the remaining mechanism plate to spacer screw (3) in the hole in front of the key post bushing.

(5) Where they come together, coat the edges of the mechanism plate and the top of the case with black wood lacquer dope; refer to paragraph 6.c.(5), this section. Then place the two neck strap brackets (8) in place and fasten them with the four case to mechanism plate screws (7).

e. FOCUSING TUBE ASSEMBLY.

(1) On each side of the opening into which the focusing tube assembly (6, figure 30) is to fit, the outside edge of the flange projects about 1/16 inch for a distance of about 1½ inches. Coat the inside of the flange at these points with black wood lacquer dope; refer to paragraph 6.c.(5), this section.

(2) Remove the inside focusing tube from the outside focusing tube.

(3) Turn back the focusing tube insert (4, figure 30) until it is fitting tightly up against the focusing tube gear. Do not exert too much pressure on the insert; otherwise its shape may be distorted, causing binding of the focusing tube assembly after it has been reassembled to the camera.

(4) Turn the focusing idler gear (23, figure 31) toward the front until it is tight up against the case. Then back it off approximately 1½ teeth. Holding the gear in place with the thumb of the left hand, grasp the outside focusing tube in the right hand and line up the cut-out portions of the focusing tube insert (4, figure 30) with the projecting portions of the flange on the case. Without allowing the focusing idler gear to rotate, push the outside tube into the case, at the same time meshing the focusing tube gear with the focusing idler gear. If the focusing tube stop (7, figure 30) is in place on the focusing tube gear, the outside tube must be held in such a position that it is inserted in the case with the stop on the bottom of the focusing tube gear and as close as possible to the idler gear. This will usually require backing off the focusing tube gear very slightly from the focusing tube insert. If the focusing tube stop is not on the focusing tube gear, refer to paragraph 6.q., this section. Set the focusing tube insert firmly against the case and turn on the focusing tube insert retaining ring (3, figure 30). Tighten the retaining ring with special tool No. 501-B.

(5) With the outer tube fully extended, insert the inside focusing tube in such a manner that when the inside tube is screwed all the way in, the shutter operating lever is at the top and the inner end of the inside focusing tube extends slightly farther into the case than the focusing tube gear. To do this will usually require several trials, starting the inside focusing tube on different threads of the outer tube.

(6) Replace the focusing tube retaining ring lock screw (12, figure 30).

(7) If there was a washer under the focusing knob (11, figure 30), replace it over the focusing pinion. Then replace the focusing knob and fasten it with the focusing knob screw (10, figure 30).

(8) With cameras of type A, screw the focusing tube guide plate (2, figure 21) and the focusing tube guide assembly (6, figure 21) to the inside focusing tube with the two focusing tube guide plate to tube screws (1, figure 21) and the four focusing tube guide to tube lower screws (4, figure 21). With cameras of types B and C, fasten the focusing tube guide assembly (14, figure 21) to the inside focusing tube with the two focusing tube guide to focusing tube screws (17, figure 30) and the four focusing tube guide to tube lower screws (4, figure 21). The inner end of the shutter operating lever and end assembly (13, figure 21) must extend through the slot in the shutter operating lever slide. Fasten the focusing tube guide lug assembly (16, figure 21) to the focusing tube guide assembly with the two focusing tube guide lug to focusing tube guide screws (17, figure 21). On cameras of type C, hook the guide lug spring (19, figure 21) over the studs on the focusing tube guide lug assembly (16, figure 21) and on the right shutter operating lever lug assembly (18, figure 21).

NOTE

If the focusing tube assembly on a camera of type A has been replaced by a new assembly, refer to paragraph 5.d., this section.

f. REPLACEMENT OF SHUTTER.

(1) Insert the shutter light guard (2, figure 30) in the focusing tube assembly with the smaller opening toward the back of the camera.

CAUTION

The shutter light guard is made of thin metal and should be handled with care. If it is bent by rough handling, it may bind on the shutter operating disc and cause faulty operation of the shutter, or, in severe cases, jamming of the camera.

(2) Replace the shutter complete (1, figure 30) in the focusing tube, guiding the end of the shutter operating lever and end assembly (5, figure 30) into the hole in the shutter operating disc (15, figure 21). On cameras of type A, the end of the shutter operating lever (5, figure 21) fits over the stud on the shutter operating disc assembly (7, figure 21). Seat the shutter firmly with the cable release nut in the cut-out slot in the focusing tube.

(3) With a jeweler's screw driver, turn on the shutter retaining ring (11, figure 33) located just behind the speed control ring with pointers assembled (10, figure 33). Tighten the shutter retaining ring with special tool No. 501-A.

g. PARTS ON MECHANISM PLATE.

(1) The range finder couplet bar (13, figure 31) will fit into the case with the end having the cut-out toward the back. Push the range finder couplet bar shaft (15, figure 31) through the couplet bar until the back end is flush with the end of the couplet bar.

(2) Extend the focusing tube assembly to the limit of travel. The front end of the range finder couplet bar shaft (15, figure 31) fits in a hole in the front of the case which is located near the top right corner of the focusing tube guide assembly. This hole extends through the case and on the front of the case is covered only by the leather. With the free end of the range finder couplet bar spring (14, figure 31) turned toward the top of the case and resting against the right-hand spool housing assembly (10, figure 31), insert the projecting end of the range finder couplet bar shaft in the hole in the case. Then, allowing the leather covering on the front of the case to be pushed out, push the front end of the shaft far enough into the hole so that the back end of the shaft can be slipped past the overhanging back edge of the mechanism plate. Guiding the back end of the shaft into the hole in the mechanism plate, push down the leather on the front of the case with the flat side of a screw driver blade.

(3) In order to prevent the range finder adjusting screw bracket (17, figure 22) from catching on the range finder couplet bar (15, figure 22) and throwing the range finder out of adjustment, follow the instructions given in paragraph 2.h.(5), this section.

(4) Check the focusing tube assembly to make sure that it operates smoothly, without binding or side play. Since the upper guide rod (5, figure 22) is eccentric at one end, it provides an adjustment of the sidewise motion of the focusing tube assembly as the latter is extended or retracted. By means of the screw driver slot in the back end, turn the guide rod as required for smooth operation of the focusing tube assembly. If not enough adjustment can be obtained with the guide rod, loosen the two focusing tube guide lug to focusing tube guide screws (17, figure 21), move the focusing tube guide lug assembly (16, figure 21) as required, and tighten the screws. On cameras of type A, remove the two focusing tube guide plate to tube screws (1, figure 21) and pry off the focusing tube guide plate (2, figure 21), breaking the shellac seal. Put fresh shellac under the plate and replace the plate and screws. Adjust the position of the plate as required and tighten the screws.

(5) Replace the safety control gear (31, figure 28) on top of the safety control driving shaft assembly and fasten it with the gear to shaft screw (30, figure 28).

(6) Place the key post gear (6, figure 29) over the pin on the key complete (7, figure 29). Note that the flattened sides of the key post gear pin must be turned vertically to allow the gear to seat properly over the pin. Then place the key post washer (5, figure 29) over the key post gear and replace the key complete with the flat side of the key cam toward the left end of the camera.

(7) Replace the safety control cam complete (4, figure 29) on the key post with the gear on the bottom meshed with the safety control idler gear (28, figure 28).

(8) Replace the safety lever assembly (2, figure 28) with the two prongs on the left end above and below the gear on the safety control cam complete (32, figure 28). The flat side of the end of the shutter setting gear stop lever (4, figure 28) must be to the right of the second stud from the left end of the safety lever assembly, and the right end of the safety lever assembly must bear against the near side of the trigger lock spring (13, figure 28). Fasten the safety lever assembly with the safety lever to plate stud nut (8, figure 28) and shellac the nut in place. Then hook the safety lever spring (1, figure 28) over the first stud on the left end of the safety lever assembly.

(9) Place the trigger plate bell crank (16, figure 28) in position with the long end toward the front of the camera and the hole to the right. Fasten it with the trigger plate bell crank stud (15, figure 28).

(10) Check the shutter setting guide spring (20, figure 28) to make sure that the curved end is looped over the pin on the shutter setting blade assembly

(4, figure 22) which extends through the mechanism plate and the shutter setting lever light guard (19, figure 28) on top of the mechanism plate.

(11) At this point check the synchronization of the camera by following through the winding cycle as described in section VI, paragraph 3.b. If the spring on the safety lever assembly (2, figure 28) fails to slip off the second step on the safety lever spring stop plate (5, figure 28) at the exact instant the shutter is released, refer to paragraph 5.f., this section, for adjustment instructions.

CAUTION

Be sure the focusing tube assembly is fully extended so that the trigger plate (7, figure 22) is in the proper position to release the shutter. Also make sure that the trigger button (11, figure 28) is turned so that the vertical slot faces toward the left front corner of the camera case. If the trigger button is allowed to turn around so that it is in the "time" position, it will stay down when pushed down, allowing the trigger plate to hang down inside the case. Then, when the first step of the winding cycle is attempted, the trigger plate will be in the way when the shutter operating lever or the right shutter operating lever lug is moved to the right as the shutter setting blade assembly (4, figure 22) moves toward the right to cock the shutter, and the camera will be jammed. The only way the jam can be cleared is to turn the trigger button around to its proper position.

h. RANGE FINDER PLATE.

(1) Holding the upper range finder coupler arm (17, figure 28) in toward the front of the camera, remove the wedge (18, figure 28) which was used to hold the coupler arm in position. Put on the back of the camera; this will hold the coupler arm until the range finder plate has been replaced.

(2) With the focusing tube fully retracted, turn the range finder cam assembly (6, figure 27) on the range finder plate counterclockwise until the first tooth of the gear on the cam assembly is opposite the end of the cam follower assembly (10, figure 27). This will allow the range finder actuating lever assembly (8, figure 22) to pass through the hole in the mechanism plate. Fit the range finder plate down over the mechanism plate and insert, but do not tighten, the two range finder plate to case screws (11, figure 27).

CAUTION

Make sure the focusing tube assembly is retracted. If it is extended beyond the infinity position, the stud on the range finder actuating lever assembly (8, figure 22) will go on the camera on the wrong side of the range finder adjusting screw (16, figure 22).

NOTE

If the counter dial assembly (3, figure 26) and the safety control stop pawl (19, figure 27) were left on the range finder plate in disassembling the camera, the counter dial must be turned to any number except "0" in order to move the end of the stop pawl away from the safety control cam complete (23, figure 27). Also, the cut-out on the safety control cam complete must face toward the counter dial assembly. To turn it to the proper position, follow, as far as necessary, the cycle of operation of the camera as described in section VI, paragraph 3.a.

(3) Insert the shutter setting lever pin and lever assembly (15, figure 27) in the slot in the back of the range finder plate with the point facing toward the left front corner of the camera case. Move the lever around until the hole in the lever is under the hole for the range finder plate to mechanism plate screw (16, figure 27); then press the range finder plate down gently and seat the lever on the bushing which holds in place the shutter setting lever light guard (19, figure 28). Then tighten the two range finder plate to case screws (11, figure 27) and replace and tighten the range finder plate to mechanism plate screw.

NOTE

If a new shutter setting lever pin and lever assembly is being installed, it is advisable to bevel the under side of the point with a file to prevent it from catching on the side of the safety lever assembly (2, figure 28) as it moves over to make contact with the stud on top of the safety lever assembly.

(4) Cock the shutter slowly with the shutter setting lever and listen for the sound of the shutter as it is set and the sound of the black spring on the safety lever assembly as it moves up on the first step of the safety lever spring stop plate (5, figure 28). Both should be heard simultaneously. If they are not, an adjustment must be made. If the sound of the shutter is heard before the click of the black spring on the stop plate, remove the shutter setting lever pin and lever assembly and bend the point of the lever very slightly to the right. If the shutter is cocked after the black spring clicks over the first step on the stop plate, bend the point of the lever very slightly to the left, or, if necessary, file the end of the

lever a little where it comes in contact with the stud on the safety lever assembly.

(5) If the parallax frame assembly (7, figure 26) and the range finder eyelet lens assembly (8, figure 26) were removed from the range finder plate in disassembly, replace them and fasten with the two range finder eyelet frame screws (5, figure 26). The eyelet lens assembly should go on first with the frame toward the rear; make sure that it is straight and that it is pushed as far toward the front of the camera as it will go.

i. RANGE FINDER ACTUATING LEVER LINK. (See figure 22.)

CAUTION

Be careful not to damage the parallax frame assembly (7, figure 26) while performing the following operations.

(1) Extend the focusing tube assembly fully; then retract it slightly. With the camera upside down and level, hold the range finder actuating lever link (10) so that the long prongs are to the left and the steps in the link go up from left to right. Slip the prongs between the range finder actuating lever link washer (11) and the range finder actuating lever link nut (12).

(2) Grasp the link with a pair of tweezers and swing the right end around toward the front of the camera until it is beyond and just to the left of the range finder actuating lever to range finder cam screw (9).

(3) With a jeweler's screw driver, force the link with firm pressure toward the front of the camera until the short prongs slide over the stud on the range finder actuating lever assembly (8).

j. COUNTER DIAL ASSEMBLY AND SAFETY CONTROL STOP PAWL.

(1) Replace the safety control stop pawl (19, figure 27) and safety control stop pawl spring (20, figure 27) and fasten them with the safety control stop pawl stud (21, figure 27). With the hooked end of the stop pawl spring over the long end of the stop pawl, lift up the straight end of the spring and rest it against the right side of the projecting lug on the range finder plate.

(2) Replace the counter knob spring (4, figure 26) and hold it down with the counter dial assembly (3, figure 26) while replacing the counter knob washer (2, figure 26) and counter knob screw (1, figure 26).

k. COUNTER DIAL HOUSING COMPLETE. (See figure 25.)

(1) Replace the key post spring washer (7) on the key post with the concave side upward. Also replace the flat key post spacing washer (8) if one was used on the camera as originally assembled; this washer is not necessary unless the winding key knob shows a tendency to wobble as it is turned (after the counter dial housing complete (4) has been replaced).

(2) Replace the counter dial housing complete (4) and fasten it with the three counter dial housing to range finder plate screws (3). Make sure the key post is not binding against the housing.

(3) Replace the key knob (2) and fasten it with the key knob screw (1).

l. TIME LEVER HOUSING COMPLETE. (See figure 24.)

(1) If the trigger bushing leak light washer (5) was removed during disassembly, replace it with the clipped corner toward the right front corner of the range finder plate and fasten it along the back edge with shellac. Make sure the hole is centered around the trigger button. Slip the trigger button leak light washer (4) over the trigger button.

(2) Replace the exposure indicator tube (6) in the hole in the range finder plate directly above the red signal.

(3) Replace the time lever housing complete (3) and fasten it with the three time lever housing to range finder plate screws (1). Make sure the trigger button (7) is not binding against the housing.

(4) Turn the trigger button (7) so that the vertical slot in the side of the button is lined up with the screw hole in the time lever, and screw in the time lever key screw (2).

m. DIRECT VIEW FINDER COVER ASSEMBLY. (See figure 23.)

(1) Before replacing the direct view finder cover assembly (4), check the range finder to make sure that it is free from any of the defects illustrated in figure 48. If any of these troubles is encountered, refer to paragraph 5.i. for instructions on adjusting the optical system. Be sure all the range finder optics are perfectly clean. Even a small amount of dirt may make one or both halves of the field appear hazy. Any required cleaning can be done with a piece of wadded-up lens cleaning paper or soft, lintless cloth on the end of a toothpick, using moisture from the breath or lens cleaner as required.

CAUTION

If lens cleaner is used, it should be applied sparingly to the lens cleaning paper or cloth, not to the glass. Never use alcohol or other solvents.

(2) Check to make sure that the windows in the direct view finder cover assembly (4) are perfectly

clean. If they are not, clean them as described in subparagraph (1), preceding.

(3) Look through the range finder at a distant object and turn the focusing tube assembly in or out until the two halves of the field are lined up; this establishes the approximate infinity position of the focusing tube assembly.

NOTE

If the range finder image in the upper field cannot be moved far enough to the left to coincide with the image in the lower field, the left end prism (29, figure 27) must be adjusted. Loosen slightly the right-hand screw of the three end prism bracket to mount screws (26, figure 27) and tighten the left-hand screw. Do not adjust the center screw. On the other hand, if the image in the upper field moves very far to the left when the focusing tube assembly is retracted from the infinity position to the closed position, it may happen that the upper field cannot be moved far enough to the right to coincide with the lower field when an object at 3½ feet is viewed through the range finder. In this case, loosen slightly the left-hand screw and tighten the right-hand screw. When the end prism has been properly adjusted, the two range finder images can be made to coincide when either a distant object or an object at 3½ feet is viewed. As the focusing tube assembly is retracted from the infinity position to the closed position the upper image should move only slightly to the left of the lower image.

(4) When the range finder has been set on infinity (and an adjustment has been made to the left end prism, if adjustment was required), rotate the focusing scale (5) clockwise until the ∞ mark is centered at the front. Holding the focusing scale in position with a finger, replace the direct view finder cover assembly (4). The focusing scale pinion under the focusing scale must mesh with the gear on the range finder cam assembly (6, figure 27); if necessary, shift the focusing scale slightly until the pinion and gear mesh and the direct view finder housing is seated solidly on the range finder plate. If the focusing scale is more than slightly off the infinity position, remove the view finder housing and shift the focusing scale enough to mesh the pinion with the scale as close as possible to the infinity position. Then replace the four direct view finder to range finder plate screws (3).

(5) At this point check to make sure that the parallax frame assembly (7) is operating properly without binding on the view finder cover. The parallax frame assembly can be seen by aiming the view finder at a light and looking into it rather than through it. If the parallax frame assembly is functioning correctly, it will be seen to move smoothly downward as the focusing tube assembly is moved out toward the 3½-foot position. At the 3½-foot position the lower edge of the negative finder lens frame at the front of the view finder cover should be distinctly visible. If it is not, remove the view finder cover and adjust the parallax adjusting screw (6, figure 26) on the parallax frame assembly. After securing the proper position of the screw, shellac the screw head to prevent it from turning accidentally during use of the camera. The parallax frame assembly must not be raised too high or it will come in contact with the top of the view finder cover as the focusing tube assembly is retracted and the rectangular frame at the front end of the assembly will be bent. Jerky movement or lack of any movement of the parallax frame assembly indicates that the assembly is binding either on the range finder reflection guard (18, figure 27) or on the view finder cover. Correction of this trouble will require loosening the two range finder eyelet frame screws (5, figure 26) and shifting the position of the parallax frame assembly as required. Before tightening the screws again, make sure that the range finder eyelet lens assembly (8, figure 26) is pushed as far toward the front of the camera as it will go and that it is straight.

n. ADJUSTING RANGE FINDER. (See figure 23.)

NOTE

Whenever the direct view finder cover assembly (4) has been removed from the camera, the range finder must be adjusted **BEFORE** the lens is refocused.

(1) Temporarily replace the depth-of-focus scale (2) and the focusing scale frame (1). Make a light pencil mark on the direct view finder cover assembly (4) directly in front of the black index mark on the depth-of-focus scale. Again remove the focusing scale frame and the depth-of-focus scale.

(2) With the camera on a firm support and the diaphragm control ring retainer (7, figure 33) exactly 15 feet from a suitable test object, turn the focusing tube in or out until the upper and lower range finder images are in perfect coincidence.

(3) If the 15-foot mark on the focusing scale is to the right of the pencil mark, force the focusing scale (5) gently counterclockwise with the fingers until the two marks coincide. If the 15-foot mark on the focusing scale is to the left of the pencil line, turn the focusing scale clockwise a full revolution until it stops and then force it enough to equal the distance it was off

originally. Continue shifting the focusing scale around the shaft of the focusing scale pinion until a perfect 15-foot reading is obtained. The higher and lower readings will automatically fall in line; if they do not, the only thing that can be done is to compensate by throwing them all off by about the same amount, bearing in mind that it is more necessary for the range finder to be accurate on the shorter distances. The error may be due to the range finder cam assembly (6, figure 27), which should be replaced if necessary.

o. DEPTH-OF-FOCUS SCALE. (See figure 23.)

(1) If the depth-of-focus scale (2) was disassembled from the focusing scale frame (1) or if it is necessary to install a new scale, shellac the corners of the scale to the frame.

(2) Replace the depth-of-focus scale (2) and the focusing scale frame (1) together on the direct view finder cover (4). Fasten the frame with the two depth-of-focus scale frame to cover screws (6) if these screws were used on the camera as originally assembled. If the focusing scale frame is held in place by spring tension only, make sure that the spring lugs are formed so that the tension is adequate.

p. FOCUSING THE LENS. (See figure 22.)

NOTE

The range finder must always be adjusted BEFORE the lens is focused. Refer to paragraph 5.n., this section.

(1) Set up the camera on a firm support with the diaphragm control ring retainer (7, figure 33) exactly 15 feet from a large wall chart or calendar suitable for accurate focusing.

(2) Remove the camera back and place the ground glass of special tool No. 501-V on the back frame of the camera in the position of the film plane. The ground side of the glass must be toward the lens and the cutaway corner must be at the upper right to allow access to the adjusting screws. Fasten the ground glass in place with the spring clamp.

(3) With the diaphragm pointer set to *f*/3.5, turn the shutter speed control ring so that the red pointer is at "B" and swing the time lever counterclockwise to the time exposure position. Cock the shutter and open it by depressing the trigger button.

(4) Focus carefully on the test object by turning the focusing tube assembly. Use a magnifying glass to examine the image and make sure that it is the sharpest obtainable.

(5) Look at the focusing scale. If the 15-foot mark is not exactly at the black index mark on the depth-of-focus scale, loosen the range finder adjusting screw lock stud (18). This is the smaller screw at the upper right-hand corner of the focusing tube guide assembly.

(6) If the 15-foot mark on the focusing scale is to the left of the index mark, turn the range finder adjusting screw (16) (the larger of the two screws) clockwise until the two marks exactly coincide. If the 15-foot mark is to the right of the index mark, turn the adjusting screw counterclockwise. Then tighten the range finder adjusting screw lock stud (18).

q. FOCUSING TUBE STOP.—If the focusing tube stop (7, figure 30) was removed from the focusing tube gear on the focusing tube assembly (6, figure 30) in disassembling the camera, it should be replaced as follows:

(1) Extend the focusing tube assembly until the 3½-foot mark on the focusing scale (5, figure 23) is just to the left of the red dot for infrared focusing on the depth-of-focus scale (2, figure 23).

(2) Hold the camera with the lens down and drop the focusing tube stop (7, figure 30) into the camera case so that one end of it falls between the focusing idler gear (23, figure 31) and the tooth on the focusing tube gear at the rear of the focusing tube assembly (6, figure 30) which is almost engaged with the idler gear. Then extend the focusing tube assembly until the end of the focusing tube stop is caught between the two gears.

(3) With the blade of a screw driver, force the other end of the focusing tube stop onto the focusing tube gear. Retract the focusing tube assembly slightly and make sure that both ends of the focusing tube stop are firmly engaged on the teeth of the focusing tube gear.

(4) The focusing tube stop should prevent the range finder actuating lever link (10, figure 22) from bearing against the range finder actuating lever to range finder cam (9, figure 22). The lever link will come close to the screw in any case, but if it should actually touch, remove the lever link and file it down slightly at the point of contact.

SECTION VII
PARTS CATALOG INTRODUCTION

1. This Parts Catalog covers the roll film camera, Kodak Medalist, manufactured by the Eastman Kodak Company, Rochester 4, N.Y.

2. Section VIII, the Group Assembly Parts List, lists all major assemblies and their detail parts, indented in the order which indicates their relation to the main assembly. This list is complete for the type B camera, of which the Navy has the largest number. It is followed by two short lists for the type A and type C cameras which give only the changes that must be made to the type B list to convert it to a type A or type C list. The variations among the three types of camera are indicated in these three lists.

3. Section IX, the Numerical Parts List, lists the parts of the type B camera in numerical order and the page or pages of the Group Assembly Parts List on which the respective parts appear. This list does not include parts which occur only on the type A or type C camera.

4. Those parts which are not procurable separately from the manufacturer as maintenance parts are indicated by an asterisk (*) preceding the part number.

5. In a number of cases a part which is procurable separately should not be replaced without replacing some other part or parts. For this reason, Section VI of the Handbook of Instructions should be referred to whenever it is necessary to replace any part of the camera.

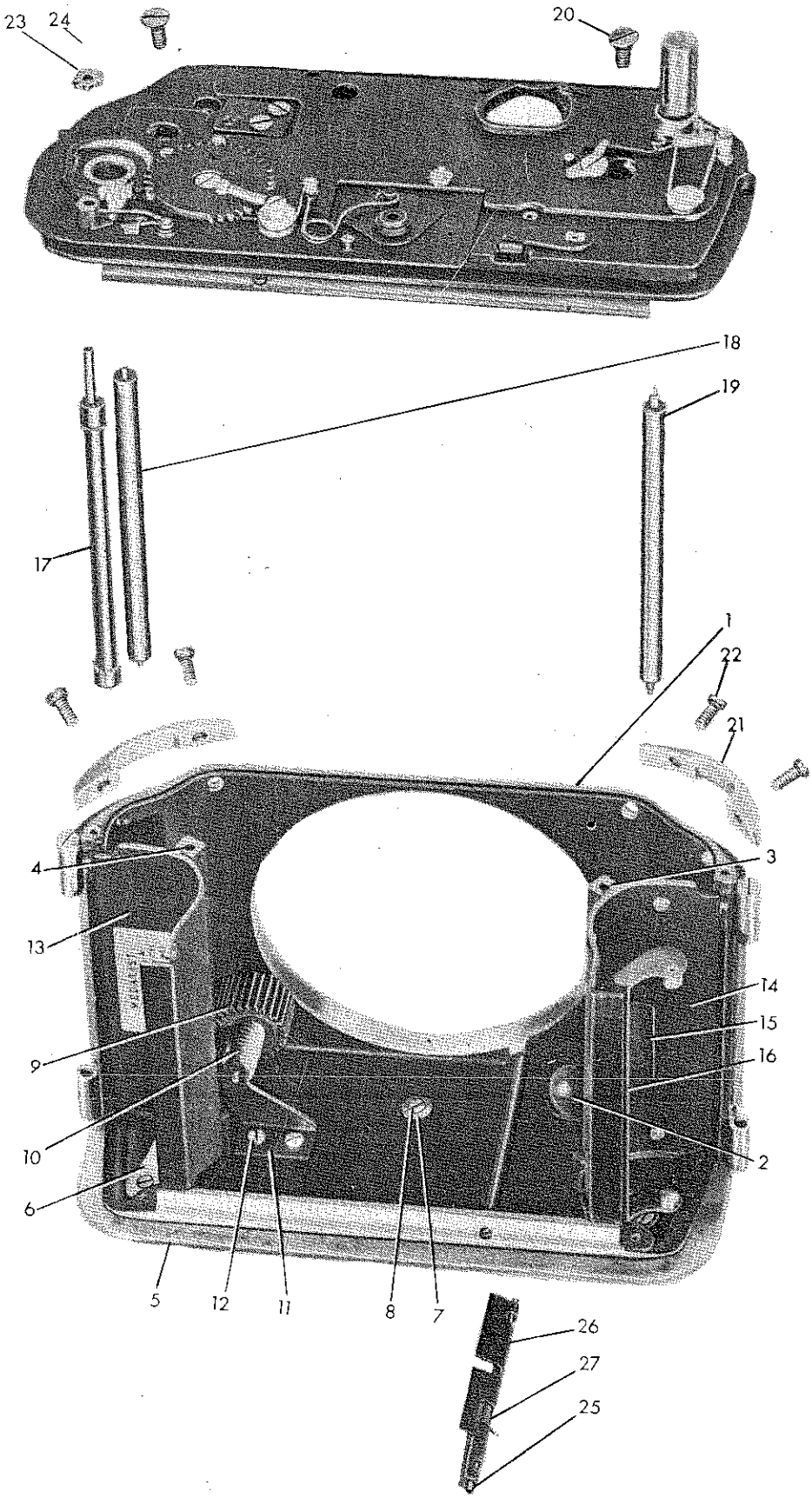


Figure 50—Mechanism Plate, Exploded from Camera Case

FIG. NO.	INDEX NO.	STOCKED	GROUP PHOTOGRAPHIC EQUIPMENT / MAJOR ASSEMBLY Kodak Medalist (Type B) — PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
			81024	Camera Complete							1			
			80994		Case Complete						1			
50	1		80993			Case Covered					1			
			*80992				Case for Covering				1			
			*78731					Case			1			
	2		78733					Nut - Tripod			1			
			*78738					Bushing - Focusing knob			1			
			*78744					Hinge - RH case			1			
			*78924					Hinge - LH case			1			
			*93436					Rivet - Key cam case			8			
			*96810					Screw - Hinge to case			4			
			*78925				Covering - Right case				1			
			*78926				Covering - Left case				1			
			*78736			Rod - Lower guide					1			
			*88743			Bushing - Guide rod eccentric					1			
			*78901			Stud - Hinge					4			
	3		78734			Spacer - RH mechanism plate					1			
			61201			Screw - Case to spacer					2			
			78740			Pinion - Focusing					1			
	4		78735			Spacer - LH mechanism plate					1			
	5		81025			Bottom Plate Covered					1			
			*78732				Plate - Bottom				1			
			*78928				Covering - Bottom case				1			
	6		78760			Tension - Spool					1			
	7		48368			Washer - Bottom plate to case					2			
	8		31463			Screw - Bottom plate to case					3			
	9		78741			Gear - Focusing idler					1			
	10		78743			Shaft - Focusing idler gear					1			
	11		78742			Bracket - Focusing idler gear					1			
	12		63894			Screw - Idler gear bracket					2			
	13		78761			Housing - LH spool					1			
	14		81022			Right Spool Housing Assembly					1			
			*78762				Housing - RH spool				1			
			*78763				Stud - Spool wear				4			
	15		78768				Spring - Spool holder				1			
	16		81021*				Spool Holder Assembly				1			
			*78764					Holder - Spool			1			
			*86890					Roller - Spool			2			
			*86891					Stud - Spool roller			2			
			40553				Rivet - Spool holder to spring				3			
			61812				Rivet - Spool holder to spool housing				3			
	17		86615			Safety Control Driving Shaft Assembly					1			
			*78772				Shaft - Safety control driving				1			
			*78773				Collar - Safety control driving shaft				2			
			*78774				Disk - Safety control driving shaft				2			
	18		78771			Roller - LH case film					1			
	19		87874			Roller - RH case film					1			
			81023			Mechanism Plate Assembly					1			
			*78769				Plate - Mechanism				1			
			*78759				Stud - Shutter setting blade				4			
			*78785				Stud - Safety control idler				1			
			*78795				Bushing - Shutter setting gear shaft				1			
			*78800				Pin - Mechanism plate				1			
			*78801				Pin - Trigger plate spring				1			
			*78808				Stud - Safety lever to plate				1			
			*78812				Sleeve - Trigger button				1			
			*78905				Stud - Trigger lock spring				1			

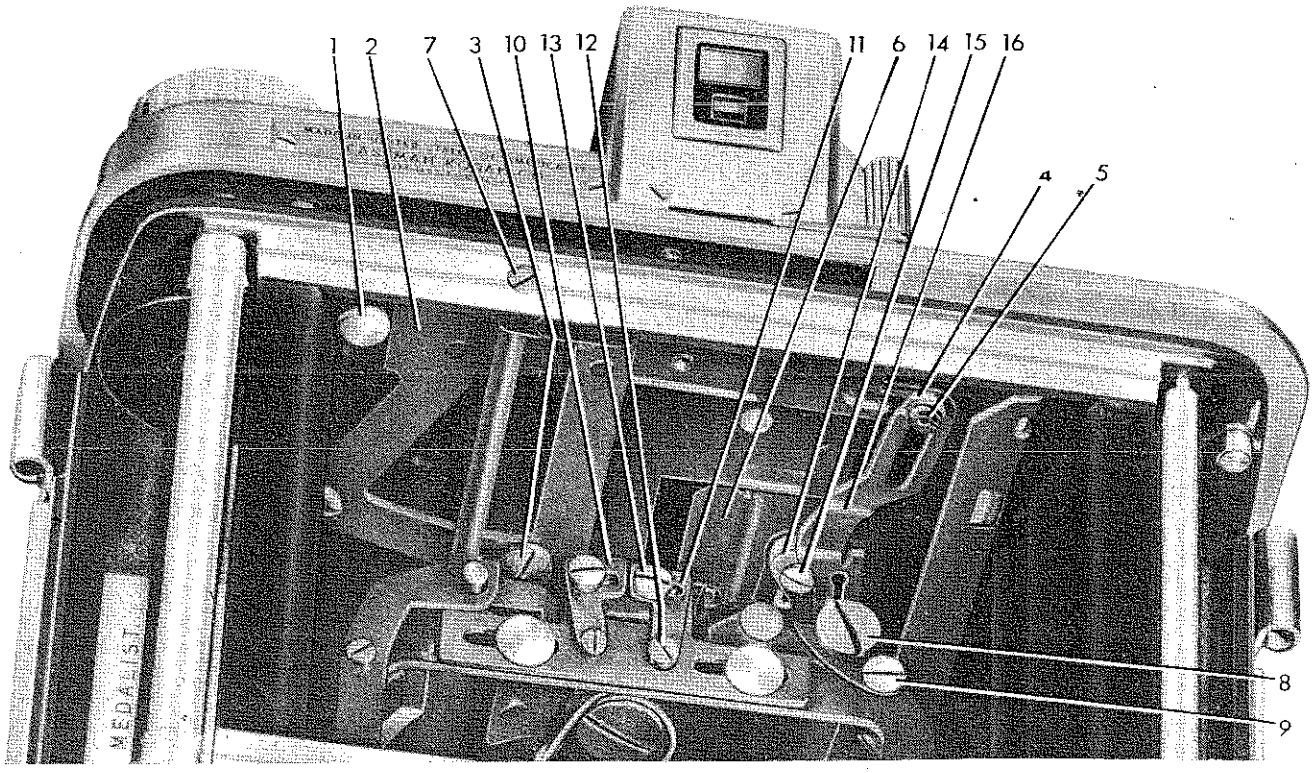


Figure 51—Parts Under Mechanism Plate

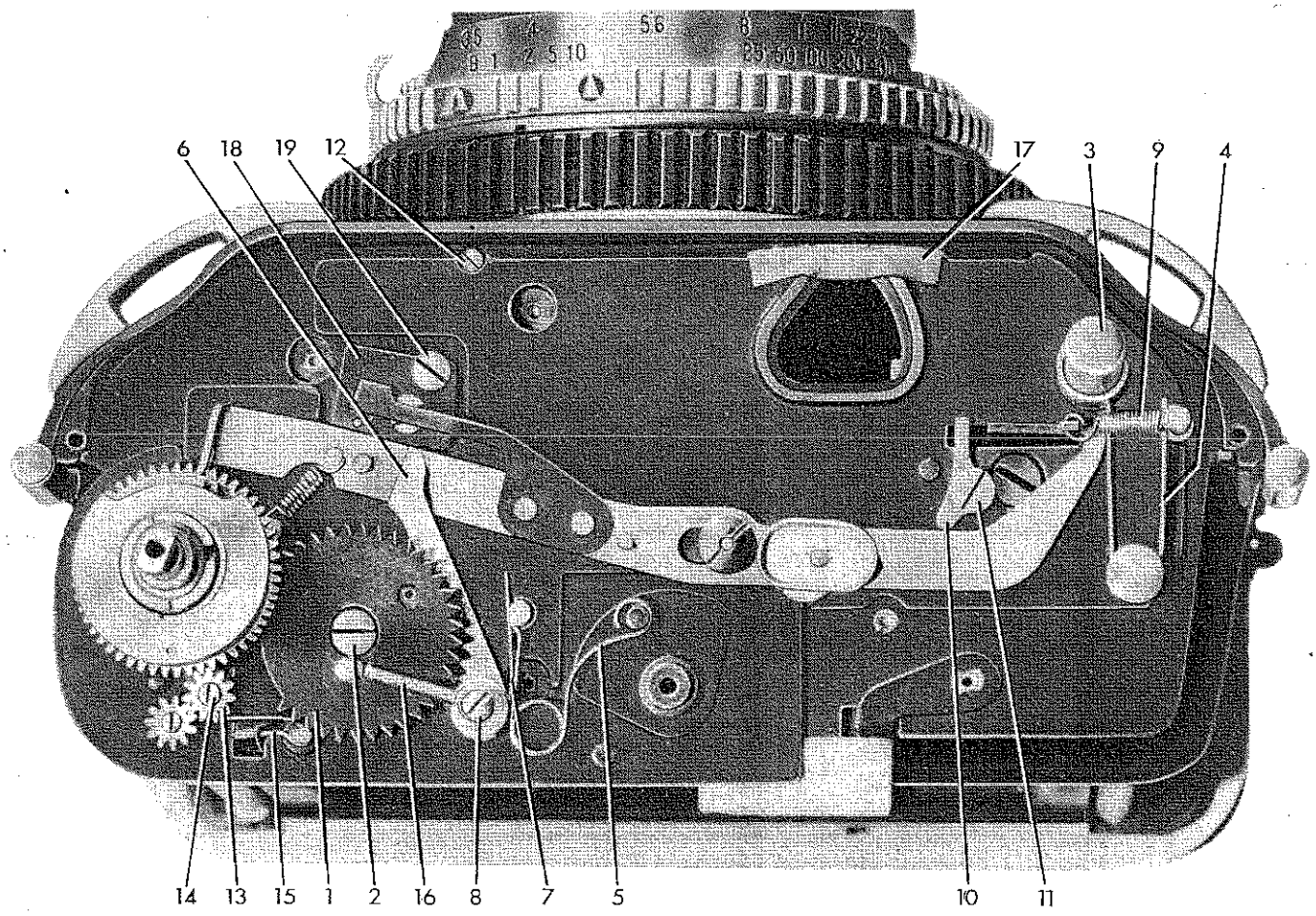


Figure 52—Mechanism Plate and Parts on Mechanism Plate

FIG. NO.	INDEX NO.	STOCKED	GROUP PHOTOGRAPHIC EQUIPMENT MAJOR ASSEMBLY Kodak Medalist (Type B) PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
			*85673					Pin -		Shutter setting guide spring	1			
			*78910					Bushing -		Key post	1			
			*80995					Range Finder Light Guard Assembly			1			
			*78819						Guard -	Range finder plate light	1			
			*78914						Stud -	Safety latch	1			
			*78916						Latch -	Safety	1			
			*88959						Stud -	Shutter setting lever stop	1			
			*16167					Rivet -		Light guard	1			
51	1		81011					Shutter Setting Gear Shaft Assembly			1			
			*78792						Shaft -	Shutter setting gear	1			
			*78794						Roller -	Shutter setting	1			
			*78797						Stud -	Shutter setting roller	1			
52	1		81018					Shutter Setting Gear Assembly			1			
			*78790						Gear -	Shutter setting	1			
			*78800						Pin -	Shutter setting spring	1			
			*78802						Stud -	Shutter setting gear stop	1			
	2		78793					Screw -		Shutter setting gear to shaft	1			
			*81020					Trigger Bell Crank Assembly			1			
			*78813						Crank -	Trigger bell	1			
			*78817						Stud -	Trigger plate	1			
			*78814					Stud -		Trigger bell crank	1			
	3		78811					Button -		Trigger	1			
	4		78903					Spring -		Trigger lock	1			
			*84323					Guard -		Shutter setting lever light	1			
			*25913					Washer -		Interlock release	1			
			*82359					Bushing -		Interlock release lever	1			
	5		78799					Spring -		Shutter setting guide	1			
			*82370					Arm -		Upper range finder coupler	1			
			*82366					Shaft -		Range finder coupler	1			
			*82369					Arm -		Range finder coupler actuating	1			
			*82371					Arm -		Lower range finder coupler	1			
			*82365					Spring -		Range finder coupler actuating arm	1			
			*82367					Screw -		Range finder coupler actuating arm	1			
			36722					Washer -		Shutter setting stop stud	1			
	6		78791					Lever -		Shutter setting gear stop	1			
	7		78907					Spring -		Shutter setting stop lever	1			
	8		78906					Stud -		Shutter setting stop	1			
	2		81012					Shutter Setting Blade Assembly			1			
			*78803						Blade -	Shutter setting	1			
			*78804						Guide -	Shutter setting blade	1			

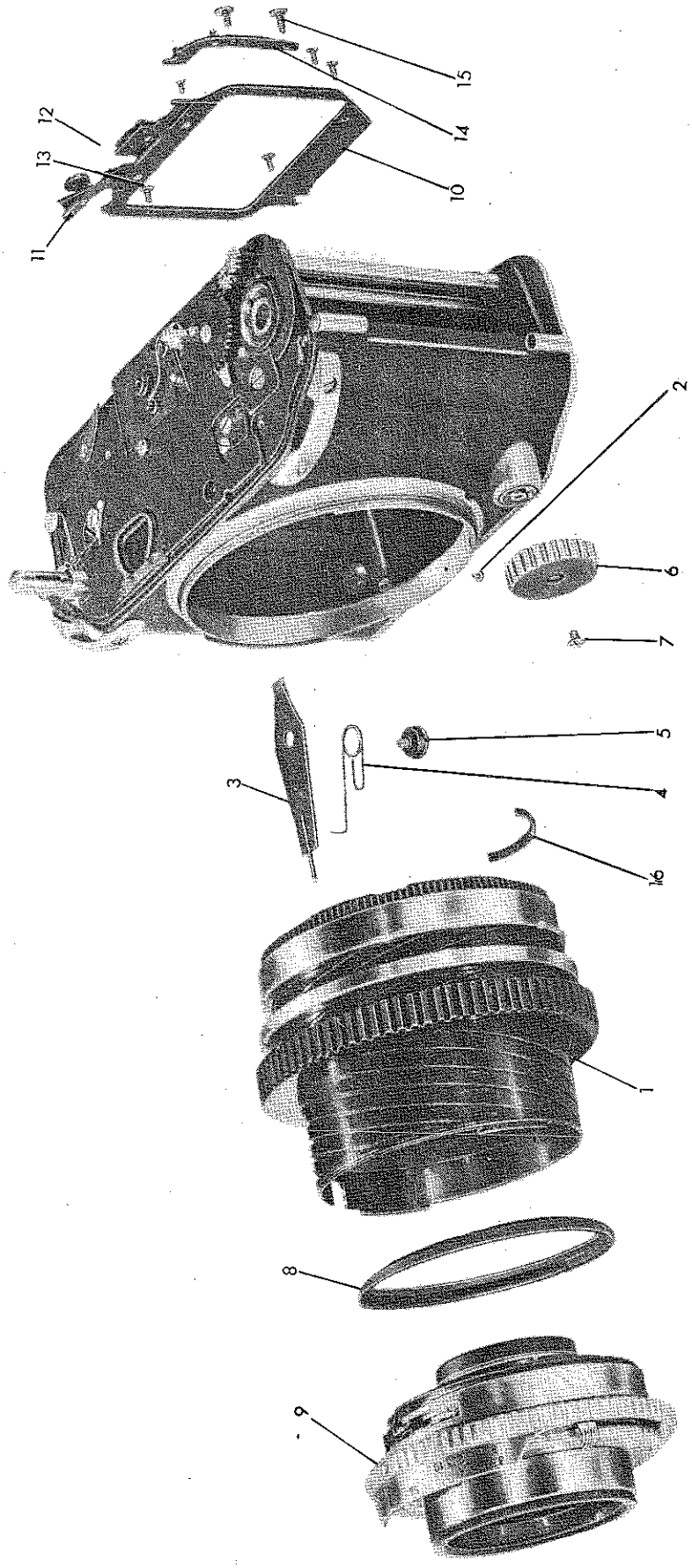


Figure 53—Shutter and Focusing Tube Assembly, Exploded from Camera Case

FIG. NO.	INDEX NO.	STOCKED	GROUP PHOTOGRAPHIC EQUIPMENT / MAJOR ASSEMBLY Kodak Medalist (Type B) / PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
			*44403							Rivet - Shutter blade to guide	2			
			*84324							Pin - Shutter setting guide	1			
51	3		78913							Nut - Shutter setting blade stud	3			
	4		33304							Washer - Range finder actuating lever link	1			
	5		78945							Nut - Range finder actuating lever link	1			
	6		78815							Plate - Trigger	1			
52	9		78904							Spring - Trigger plate	1			
	10		78816							Crank - Trigger plate bell	1			
	11		78818							Stud - Trigger plate bell crank	1			
51	7		78936							Rod - Upper guide	1			
52	12		74098							Screw - Guide rod clamping	2			
50	20		61201							Screw - Mechanism plate to spacer	2			
	21		78939							Bracket - Neck strap	2			
	22		87110							Screw - Case to mechanism plate	4			
52	13		78784							Gear - Safety control idler	1			
	14		60212							Screw - Idler gear to idler gear stud	1			
50	23		78783							Gear - Safety control	1			
	24		85058							Screw - Gear to shaft	1			
53	1		88364							Focusing Tube Assembly	1			
			*97271							Focusing Tube Sub-Assembly	1			
			*78745							Tube - Outside focusing	1			
			*78748							Tube - Inside focusing	1			
			*78898							Insert - Focusing tube	1			
			*87440							Bracket - Shutter operating lever	1			
			*66601							Rivet - Shutter operating lever bracket to tube	2			
			*78747							Gear - Focusing tube	1			
			*78937							Ring - Focusing tube insert retaining	1			
			*78746							Flange - Focusing tube	1			
			*87031							Spring - Focusing tube tension	1			
	2		71474							Screw - Focusing tube retaining ring lock	1			
	3		87449							Shutter Operating Lever and End Assembly	1			
			*87441							Lever - Shutter operating	1			
			*87447							End - Shutter operating lever	1			
	4		78754							Spring - Shutter operating lever	1			
	5		78758							Stud - Shutter operating lever	1			
	6		78737							Knob - Focusing	1			
	7		86366							Screw - Focusing knob	1			
	8		78753							Guard - Shutter light	1			
	9		94149							Shutter Complete	1			
54	1		94148							Shutter Assembled	1			
55	1		80915							Case with Cable Release Nut	1			
			*78961							Case	1			
			*60831							Stud - Setting lever spring	1			
			*83834							Nut - Cable release	1			
	2		78953							Ring - Diaphragm	1			
	3		80924							Setting Lever with Stop Stud	1			

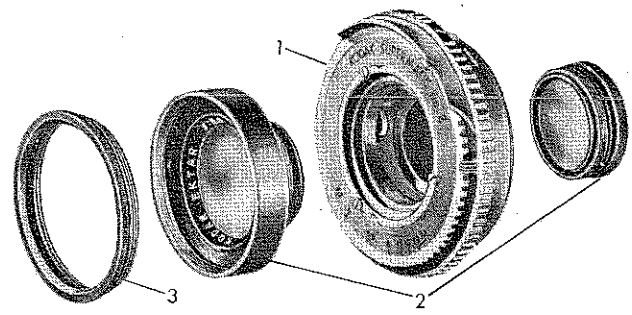


Figure 54—Shutter Complete, Exploded

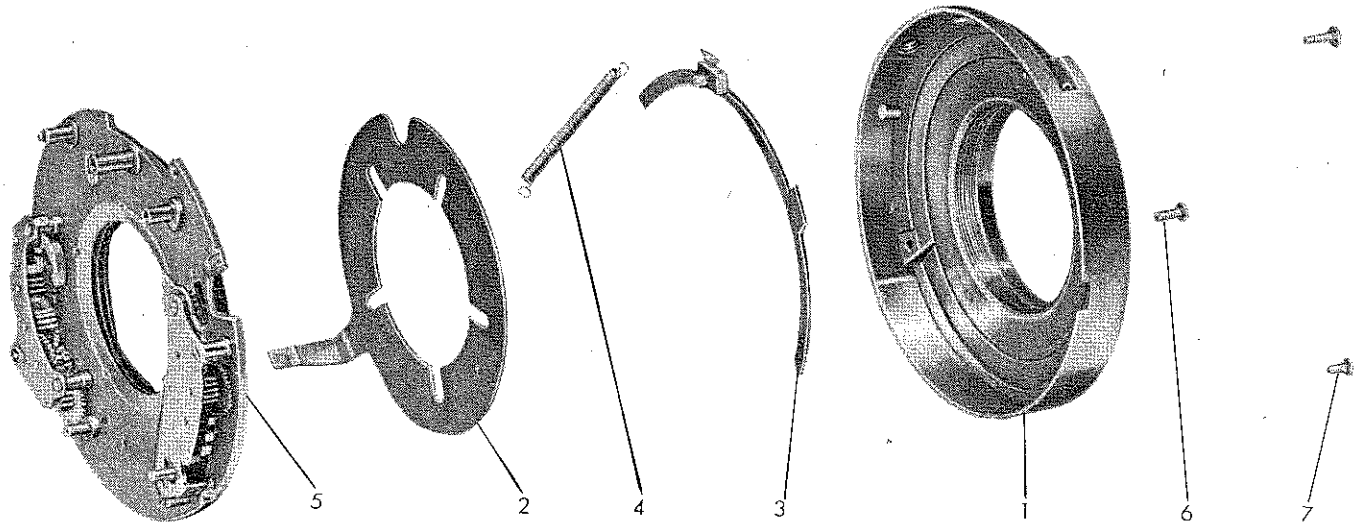


Figure 55—Shutter Mechanism Plate Complete, Exploded from Case

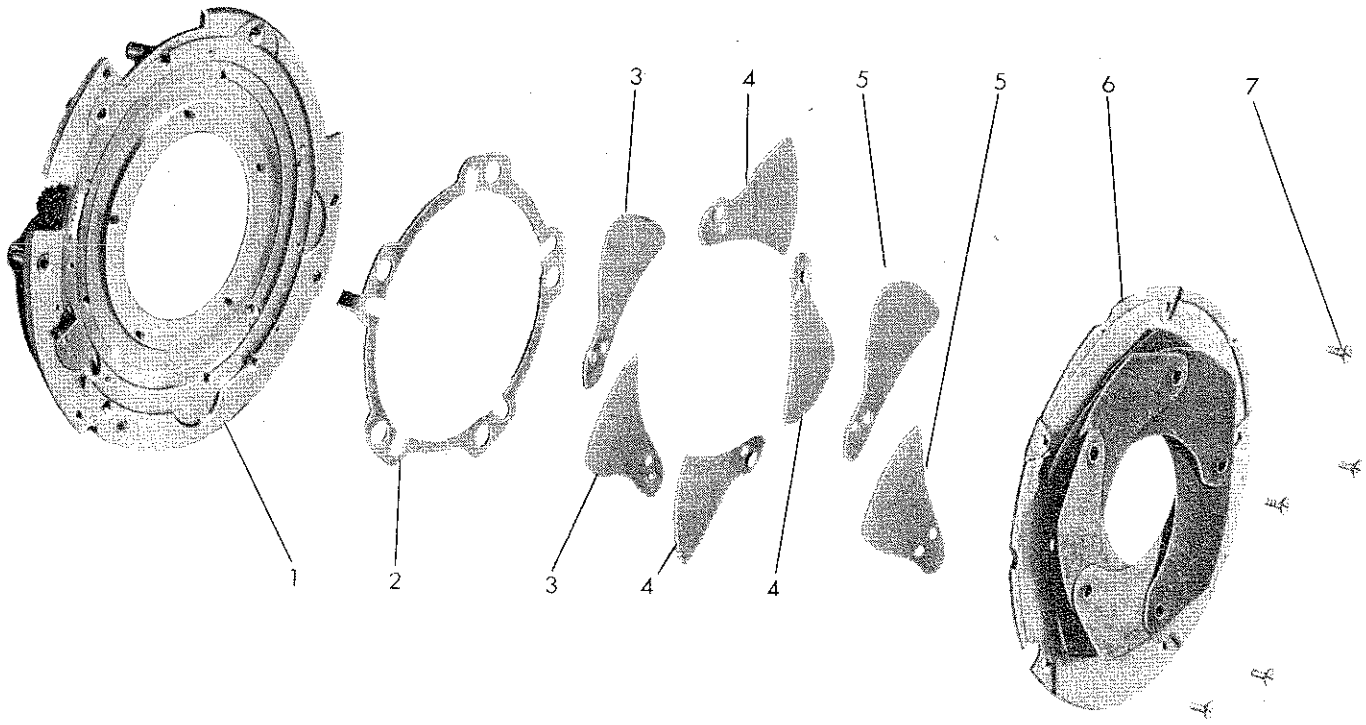


Figure 56—Shutter Mechanism Plate Complete, Exploded

FIG. NO.	INDEX NO.	STOCKED	GROUP PHOTOGRAPHIC EQUIPMENT MAJOR ASSEMBLY Kodak Medalist (Type B) PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
			*93713							Lever - Setting	1			
			*56848							Stud - Setting lever stop	1			
55	4		60832							Spring - Setting lever	1			
	5		80923							Mechanism Plate Complete	1			
56	1		80921							Mechanism Plate with Studs, Delayed Action Gears, and Retard Assembly	1			
57	1		80920							Mechanism Plate with Studs and Delayed Action Gears Assembled	1			
58	1		80919							Mechanism Plate with Studs	1			
			*78960							Plate - Mechanism	1			
			*67769							Stud - Plate blade	5			
			*56857							Stud - Time and bulb lever	1			
			*56853							Stud - Main drive	1			
			*56851							Stud -Retarding sector	1			
			*64788							Stud - Gear plate	1			
			*56886							Stud - Delayed action clutch	1			
			*64802							Stud - Delayed action gear plate	2			
			*56880							Stud - Gear plate for retard	2			
			*78981							Stud - Retard pallet spring	1			
	2		56922							Pallet with Pivot	1			
			*56875							Pallet - Delayed action	1			
			*56890							Pivot - Delayed action pallet	1			
	3		68618							#6 Escapement Wheel and Pinion Assembly for Delayed Action	1			
			*64795							Wheel - Delayed action escapement	1			

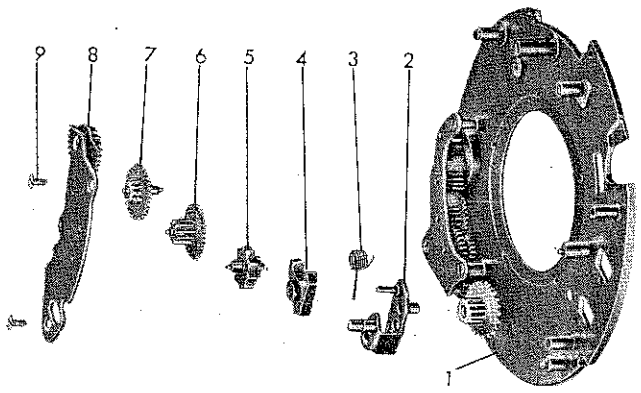


Figure 57—Retard Gear Train, Exploded

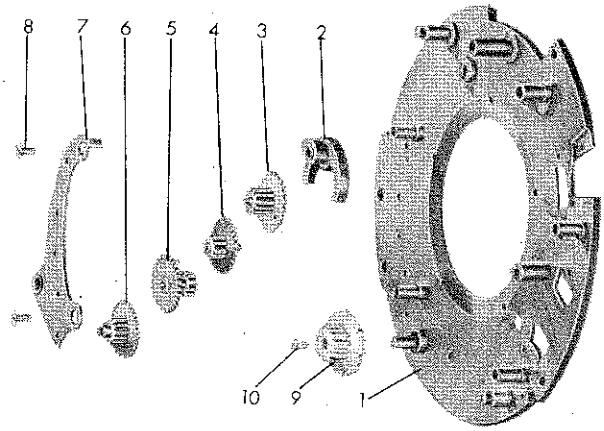


Figure 58—Delayed Action Gear Train, Exploded

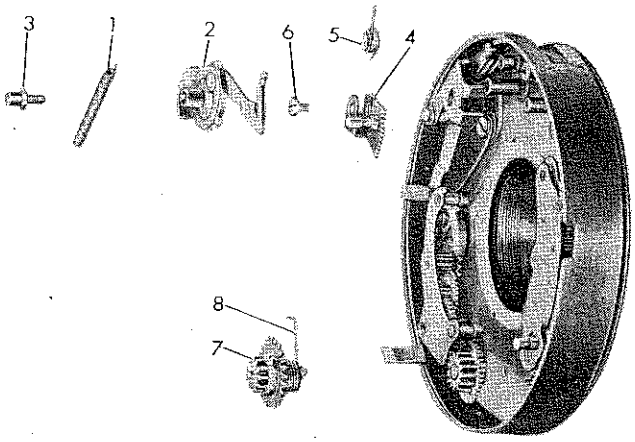


Figure 59—Parts on Shutter Mechanism Plate, Partially Exploded (I)

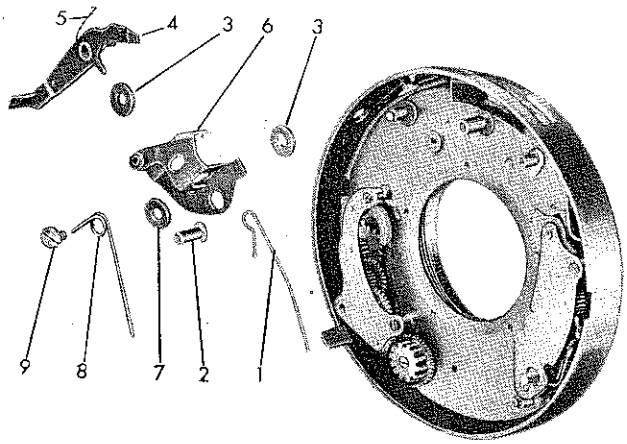


Figure 60—Parts on Shutter Mechanism Plate, Partially Exploded (II)

GROUP PHOTOGRAPHIC EQUIPMENT
MAJOR ASSEMBLY Kodak Medalist (Type B)

FIG. NO.	INDEX NO.	STOCKED	PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
			*74480							Pinion - #6 Delayed action	1			
58	4		68610							#5 Gear with #5 Pinion	1			
			*56854							Gear - #5 Delayed action	1			
			*77341							Pinion - #5 Delayed action	1			
	5		68609							#4 Gear with #4 Pinion	1			
			*56854							Gear - #4 Delayed action	1			
			*56888							Pinion - #4 Delayed action	1			
	6		68608							#3 Gear with #3 Pinion	1			
			*56854							Gear - #3 Delayed action	1			
			*56887							Pinion - #3 Delayed action	1			
	7		68619							Delayed Action Gear Plate with Stud Assembled	1			
			*64799							Plate - Delayed action gear	1			
			*63916							Stud - Gear plate	1			
	8		83470							Screw - Gear plate	2			
	9		56924							Clutch Assembly	1			
			*56855							Gear - Delayed action clutch	1			
			*56885							Pinion - Delayed action clutch	1			
			*56906							Disk - Delayed action clutch	1			
	10		11189							Screw - Clutch	1			
57	2		68627							Pallet Bracket with Studs Assembled	1			
			*66172							Bracket - Retard pallet	1			
			*56878							Stud - Pallet	1			
			*64784							Stud - Pallet control	1			
			*64789							Stud - Pallet operating	1			
	3		79021							Spring - Pallet bracket	1			
	4		67763							Pallet - Retard	1			

GROUP PHOTOGRAPHIC EQUIPMENT

MAJOR ASSEMBLY Kodak Medalist (Type B)

FIG. NO.	INDEX NO.	STOCKED	PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
57	5		95381							#4 Escapement Wheel and Pinion Assembly for Retard	1			
			*66168							Wheel - Escapement for slow speed retard	1			
			*94761							Pinion - #4 Escapement wheel, for slow speed retard	1			
	6		95380							#3 Pinion for Retard with Gear Assembled	1			
			*94764							Gear - #3 Slow speed retard	1			
			*94760							Pinion - #3 Slow speed retard	1			
	7		95379							#2 Pinion for Retard with Gear Assembled	1			
			*94763							Gear - #2 Slow speed retard	1			
			*94759							Pinion - #2 Slow speed retard	1			
	8		68617							Retard Gear Plate with #1 Pinion Assembled	1			
			*64786							Stud - #1 Pinion for retard	1			
			*95378							#1 Pinion for Retard with Gear Assembled	1			
			*94762							Sector - #1 Gear for slow speed retard	1			
			*94758							Pinion - #1, for slow speed retard	1			
			*64798							Plate - Retard gear	1			
	9		83470							Screw - Gear plate	2			
56	2		68614							Controller - Blade	1			
	3		87256							Blade with Double Blade Bushing and Stud	2			
			*62804							Stud - Double blade	1			
			*90873							Blade with Double Blade Bushing	1			
			87027							Blade	1			
			*83471							Bushing - Double blade	1			

GROUP PHOTOGRAPHIC EQUIPMENT
MAJOR ASSEMBLY Kodak Medalist (Type B)

FIG. NO.	INDEX NO.	STOCKED	PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
56	4		73426							Blade with Stud	3			
			*75907							Blade	1			
			*67765							Rivet - Blade	1			
			*67766							Bushing - Blade	1			
	5		87027							Blade	2			
	6		73432							Diaphragm Retainer Plate and Wing Assembly	1			
			*68643							Plate - Diaphragm retainer	1			
			*60816							Wing - Diaphragm	5			
	7		55321							Screw - Retainer plate	5			
55	6		56916							Screw - Plate locating	2			
	7		56915							Screw - Short plate	1			
59	1		62720							Spring - Blade controller latch	1			
	2		56891							Bushing - Latch spring	1			
	3		78967							Spacer - Bulb lever	2			
	4		78979							Bulb Lever Assembly	1			
			*78966							Lever - Bulb	1			
			*56858							Bushing - Bulb lever	1			
	5		78970							Spring - Bulb lever	1			
	6		80918							Trigger and Collar Assembled	1			
			*78959							Trigger	1			
			*78965							Collar - Delayed action trigger latch	1			
	7		56847							Washer - Trigger	1			
	8		60833							Spring - Trigger	1			
	9		56865							Screw - Trigger	1			
60	1		79878							Spring - Main drive	1			
	2		68651							Latch with Main Drive Bushing and Disk Assembled with Stud	1			
			*60822							Latch	1			
			*67762							Stud - Latch	1			
			*67761							Main Drive Bushing with Disk Assembled	1			
			*67759							Disk - Main drive	1			
			*67764							Bushing - Main drive	1			
	3		92662							Screw - Main drive	1			
	4		95377							Retarding Sector with Stud	1			
			*94757							Sector - Retarding	1			
			*66180							Stud - Sector control	1			
	5		56911							Spring - Retarding sector	1			
	6		56850							Screw - Retarding sector	1			
	7		61826							#1 Gear with #1 Pinion and Spring Assembled	1			
			*60829							Pinion - #1 Delayed action	1			
			*56884							Gear - #1 Delayed action	1			
	8		56913							Spring - Delayed action winding	1			
61	1		80922							Cover Complete	1			
			*78963							Cover	1			
			*66173							Latch - Delayed action safety	1			
			*66163							Stud - Delayed action safety latch	1			
			*87024							Stud - Speed index plate anchor	2			

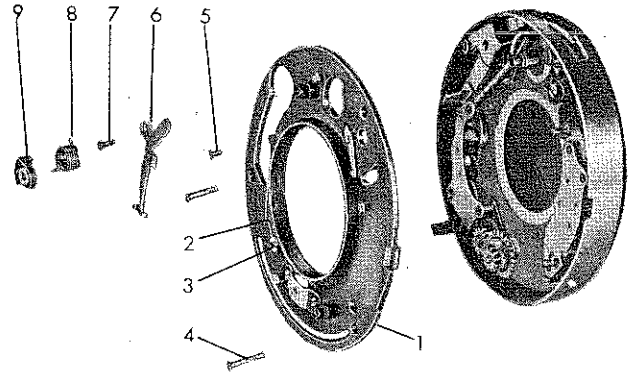


Figure 61—Cover Complete and Associated Parts, Exploded from Shutter Case

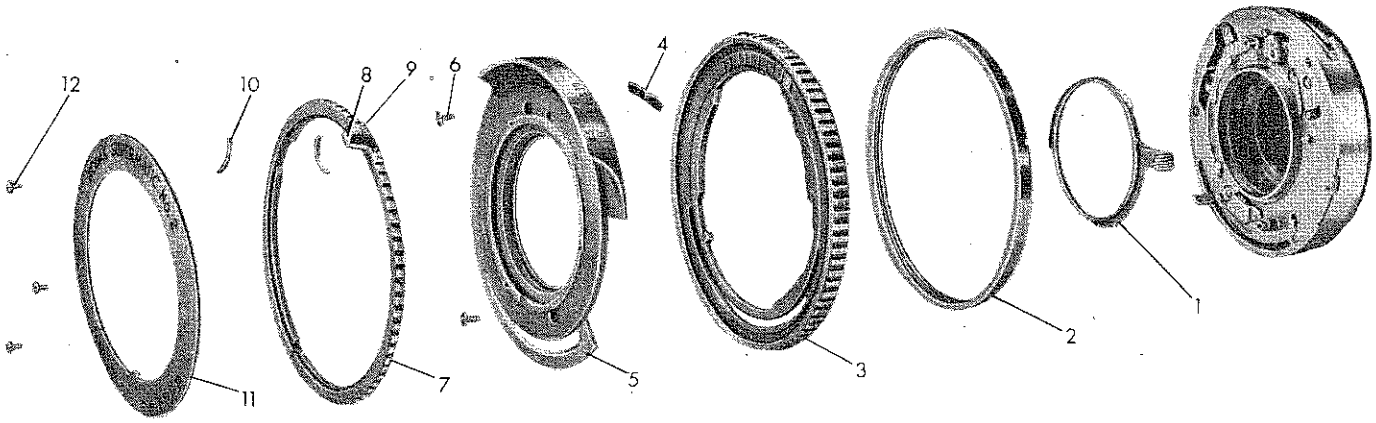


Figure 62—Parts on Front of Shutter, Exploded

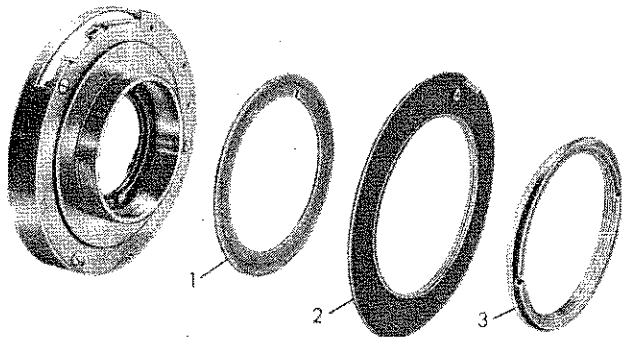


Figure 63—Parts on Back of Shutter Case, Exploded

GROUP PHOTOGRAPHIC EQUIPMENT
MAJOR ASSEMBLY Kodak Medalist (Type B)

FIG. NO.	INDEX NO.	STOCKED	PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
			*68647							Bracket - Delayed action pinion	1			
			*35625							Rivet - Delayed action pinion bracket	2			
			56914							Spring - Delayed action safety latch	1			
61	2		56912							Spring - Delayed action trigger latch	1			
	3		61189							Screw - Delayed action safety latch spring and trigger latch spring	2			
			*75431							Screw - Delayed action winding lever stop	2			
	4		87171							Screw - Long cover	2			
	5		87170							Screw - Short cover	1			
	6		78958							Latch - Delayed action trigger	1			
	7		80500							Screw - Delayed action trigger latch	1			
	8		60820							Spring - High speed	1			
	9		93073							Cam - Spring	1			
62	1		78964							Lever - Delayed action winding	1			
	2		78974							Ring - Shutter retaining	1			
	3		82989							Speed Control Ring with Pointers Assembled	1			
			*78954							Ring - Speed control	1			
			*78982							Pointer - Speed control ring	2			
			*73877							Washer - Speed control ring pointer (black)	1			
			*73878							Washer - Speed control ring pointer (red)	1			
	4		78971							Spring - Speed control ring tension	1			
	5		95023							Plate - Speed and diaphragm index	1			
	6		93298							Screw - Speed index plate anchor stud	2			
	7		80917							Diaphragm Control Ring with Pointer Assembled	1			
			*78951							Ring - Diaphragm control	1			
	8		78952							Pointer - Diaphragm	1			
	9		78980							Screw - Diaphragm pointer to diaphragm control ring	2			
	10		86602							Spring - Diaphragm control ring	2			
	11		95024							Retainer - Diaphragm control ring	1			
	12		87025							Screw - Diaphragm control ring retainer	3			
63	1		78976							Spacer - Shutter operating disk	1			
	2		78975							Disk - Shutter operating	1			

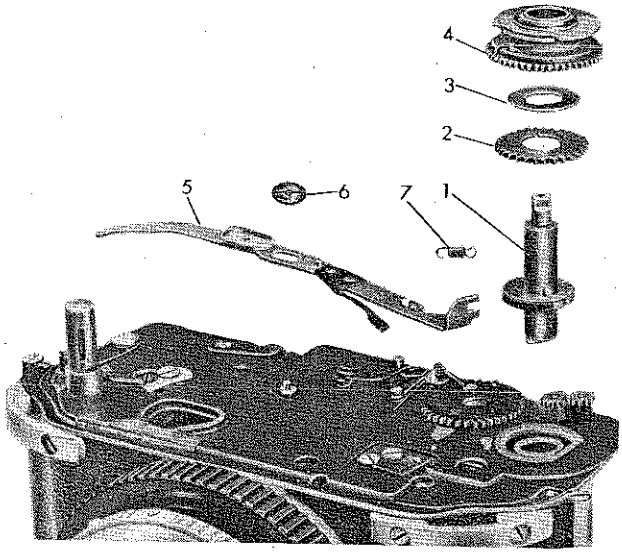


Figure 64—Parts on Mechanism Plate, Exploded from Camera

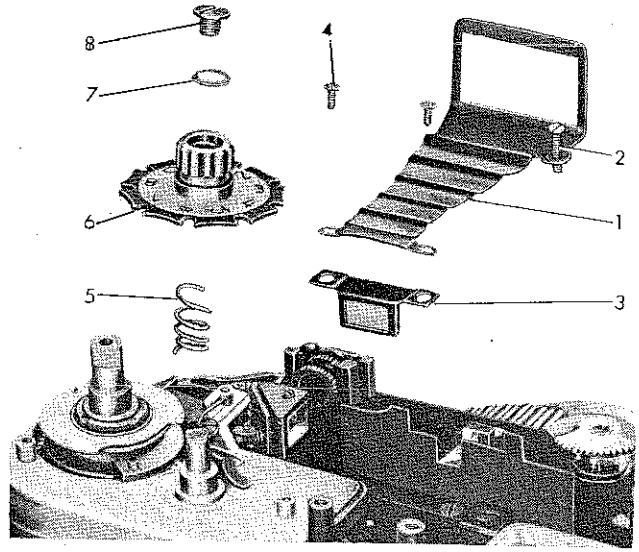


Figure 66—Counter Dial Assembly, Exploded from Camera

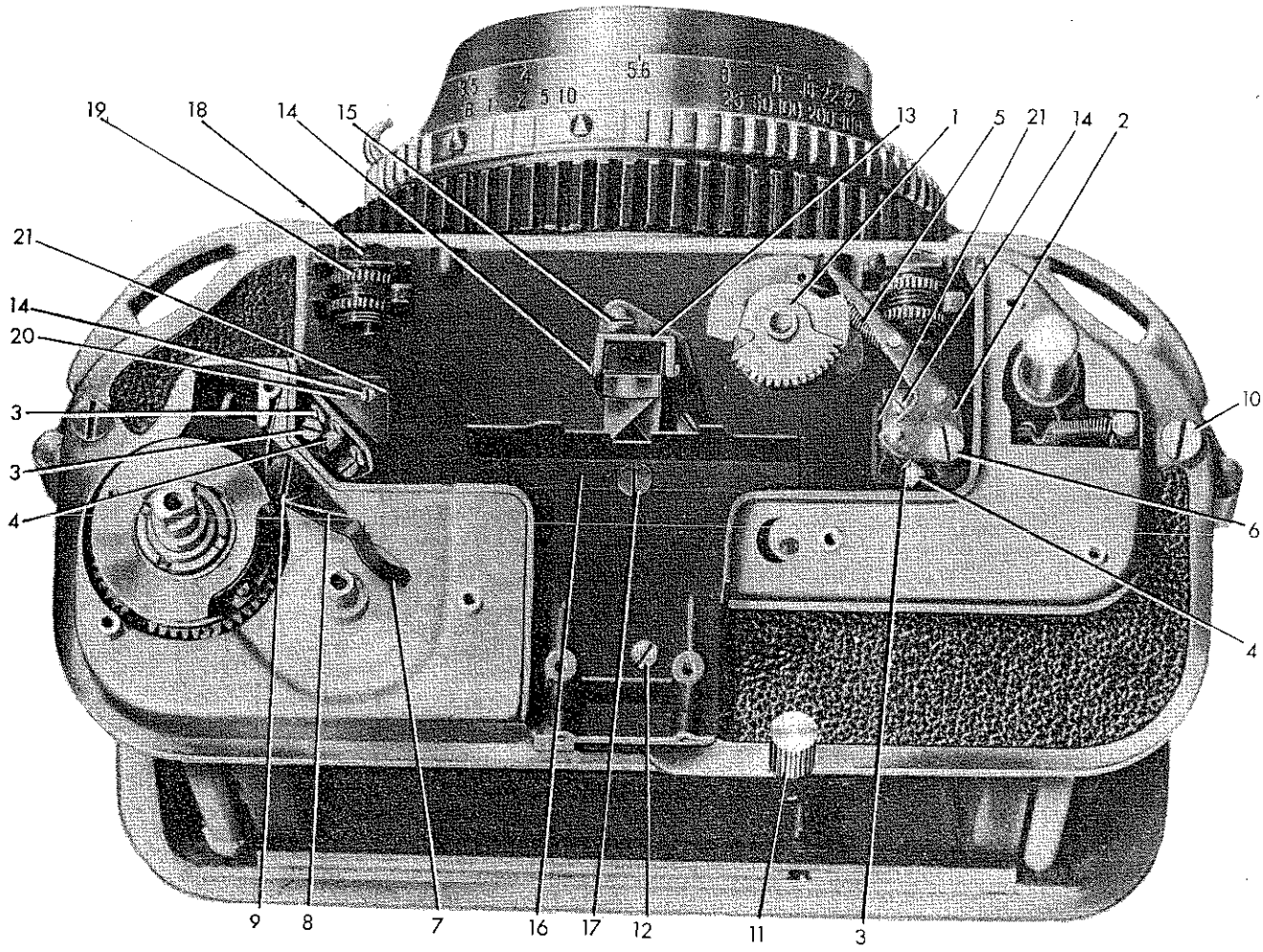


Figure 65—Range Finder Plate with Range Finder Optics

GROUP PHOTOGRAPHIC EQUIPMENT
MAJOR ASSEMBLY Kodak Medalist (Type B)

FIG. NO.	INDEX NO.	STOCKED	PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
63	3		78977					Nut	-	Shutter operating disk bearing	1			
54	2		78969				Assembly	of		100-mm Formula J-13 F3.5 Kodak Ektar Lens	1			
	3		HE25466				Insert	-		Adapter Ring, Series VI				
53	10		88365		Focusing		Tube	Guide	Assembly		1			
			*78749			Guide	-	Focusing tube			1			
51	8		78751			Screw	-	Range finder adjusting			1			
53	11		78752			Lock	-	Range finder adjusting screw			1			
51	9		78818			Stud	-	Range finder adjusting screw lock			1			
			*82364			Stud	-	Range finder adjusting screw bracket			1			
			*82368			Bracket	-	Range finder adjusting screw			1			
			*87443			Slide	-	Shutter operating lever			1			
			*87445			Stud	-	Shutter operating lever slide			2			
	10		93291			Lug	-	Left shutter operating lever			1			
			93292			Lug	-	Right shutter operating lever (For replacement, order 94288, Right Shutter Operating Lever Lug Assembly			1			
	12		85052			Screw	-	Lower operating lever lug			2			
	13		87718			Screw	-	Slide lug			2			
53	12		95749		Screw	-	Focusing tube guide to focusing tube				2			
	13		78750		Screw	-	Focusing tube guide to tube lower				4			
	14		92559		Focusing	Tube	Guide Lug Assembly				1			
			*87446			Lug	-	Focusing tube guide			1			
			*88958			Stud	-	Tube stop			1			
			*94165			Stud	-	Guide lug spring			1			
	15		85052		Screw	-	Focusing tube guide lug to focusing tube guide				2			
50	25		82360		Shaft	-	Range finder couplet bar				1			
	26		82361		Bar	-	Range finder couplet				1			
	27		82372		Spring	-	Range finder couplet bar				1			
64	1		88118		Key	Complete					1			
			*6247			Spring	-	Friction roller pressure			3			
			*21635			Roller	-	Friction			3			
			*78776			Post	-	Key			1			
			*78778			Pin	-	Key post gear			1			
			*78934			Cam	-	Key			1			
			90888			Washer	-	Key post			1			
	2		78777		Gear	-	Key post				1			
	3		90888		Washer	-	Key post				1			
	4		81016		Safety	Control	Cam Complete				1			
			*81015			Safety	Control Cam Assembly				1			
			*78780				Cam	-	Safety control		1			
			*78782				Pin	-	Safety control stop		1			
			*81017			Safety	Control Driver Assembly				1			
			*78786				Driver	-	Safety control cam		1			
			*78787				Stud	-	Safety control cam driver		1			

FIG. NO.	INDEX NO.	STOCKED	GROUP PHOTOGRAPHIC EQUIPMENT / MAJOR ASSEMBLY Kodak Medalist (Type B) / PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
			*78788							Disk - Safety control cam	1			
			*78775							Gear - Safety control clutch	1			
			*78779							Nut - Safety control clutch gear lock	2			
			*78781							Spring - Safety control clutch	1			
64	5		81014							Safety Lever Assembly	1			
			*78805							Lever - Safety	1			
			*78807							Stud - Safety lever spring	1			
			*78908							Stop - Safety lever spring	1			
			*57237							Rivet - Safety lever spring stop to safety lever	2			
			*78919							Stud - Safety lever cam	1			
			*82362							Stud - Interlock release	1			
			*86794							Guard - Exposure window light	1			
	6		78913							Nut - Safety lever to plate stud	1			
	7		78806							Spring - Safety lever	1			
52	15		78915							Spring - Safety latch	1			
	16		85718							Spring - Shutter setting gear	1			
	17		93253							Liner - Range finder actuating lever opening	1			
	18		78909							Plate - Safety lever spring stop	1			
	19		66892							Screw - Safety lever spring stop plate to mechanism plate	2			
			*78938							Dowel - Safety lever stop plate	1			
			80998							Range Finder Plate Complete	1			
			*78820							Plate - Range finder	1			
			*78911							Bushing - Range finder cam	1			
			*78900							Stud - Counter knob	1			
			*78929							Covering - Right range finder plate	1			
			*78930							Covering - Left range finder plate	1			
65	1		81006							Range Finder Cam Assembly	1			
			*78850							Cam - Range finder	1			
			*78851							Gear - Focus scale	1			
51	14		81007							Range Finder Actuating Lever Assembly	1			
			*78852							Lever - Range finder actuating	1			
			*78853							Stud - Range finder actuating lever	1			
	15		87718							Screw - Range finder actuating lever to range finder cam	1			
65	2		80999							Cam Follower Assembly	1			
			*78847							Follower - Range finder cam	1			
			*78897							Stud - Range finder cam follower spring	1			
			*78844 Commercial							Mount - Right end prism	1			
										Ball Bearing (53457) 1/16" steel ball (Hartford Steel Ball Co., Hartford Conn.) or equiv.	1			
			*78845							Bracket - End prism mount	1			
	3		60212							Screw - End prism bracket to mount	2			
	4		78943							Screw - Right end prism bracket to mount	1			
			*62888							Rivet - Cam follower to bracket	2			
			*78846							Stud - End prism bearing	1			
	5		78849							Spring - Range finder cam follower	1			

FIG. NO.	INDEX NO.	STOCKED	GROUP PHOTOGRAPHIC EQUIPMENT MAJOR ASSEMBLY Kodak Medalist (Type B) PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
65	6		59044							Screw - End prism bearing stud	1			
	7		78830							Pawl - Safety control stop	1			
	8		78832							Spring - Safety control stop pawl	1			
	9		78831							Stud - Safety control stop pawl	1			
			*84995							Washer - Eccentric counter gear stud	1			
	10		94058							Screw - Range finder plate to case	2			
	11		85676							Shutter Setting Lever Pin and Lever Assembly	1			
			*84322							Lever - Shutter setting	1			
			*84321							Pin - Shutter setting lever	1			
	12		56790							Screw - Range finder plate to mechanism plate	1			
51	16		78944							Link - Range finder actuating lever	1			
65	13		81005							Erecting and Coincidence Prism Assembly	1			
			*78862							Erecting Prism Assembly	1			
			*78864							Mask - Erecting prism	1			
			*78860							Mount - Erecting and coincidence prism	1			
	14		66716							Screw - Erecting prism retaining	2			
			*78863							Coincidence Prism Assembly	1			
	15		66860							Screw - Coincidence prism mount to range finder plate	2			
	16		83952							Guard - Range finder reflection	1			
	17		77261							Screw - Range finder reflection guard	1			
	18		81000							Objective Lens Mount Assembly	2			
			*65153							Lens - Objective	2			
			*78840							Mount - Objective lens	2			
	19		85053							Nut - Objective lens mount	4			
	20		81003							Left End Prism Assembly	1			
	21		78843							Prism - End	1			
			*78858							Mount - Left end prism	1			
	14		66716							Screw - End prism retaining	1			
			Commercial							Ball Bearing (53457) 1/16" steel ball (Hartford Steel Ball Co., Hartford, Conn.) or equiv.	1			
			*78859							Bracket - Left end prism mount	1			
	3		60212							Screw - End prism bracket to mount	3			
	4		78943							Screw - Left end prism bracket to mount	1			
	3		60212							Screw - Left end prism bracket mounting	2			
	21		78843							Prism - End	1			
	14		66716							Screw - End prism retaining	1			
66	1		81001							Parallax Frame Assembly	1			
			*78855							Frame - Parallax	1			
			*78856							Bearing - Parallax adjusting screw	1			
	2		69083							Screw - Parallax adjusting	1			
	3		81002							Range Finder Eyelet Lens Assembly	1			
			*78857							Lens - Range finder eyelet	1			
			*78854							Frame - Range finder eyelet	1			
	4		60212							Screw - Range finder plate eyelet frame	2			
	5		78827							Spring - Counter knob	1			
	6		81008							Counter Dial Assembly	1			
			*78828							Dial - Counter	1			

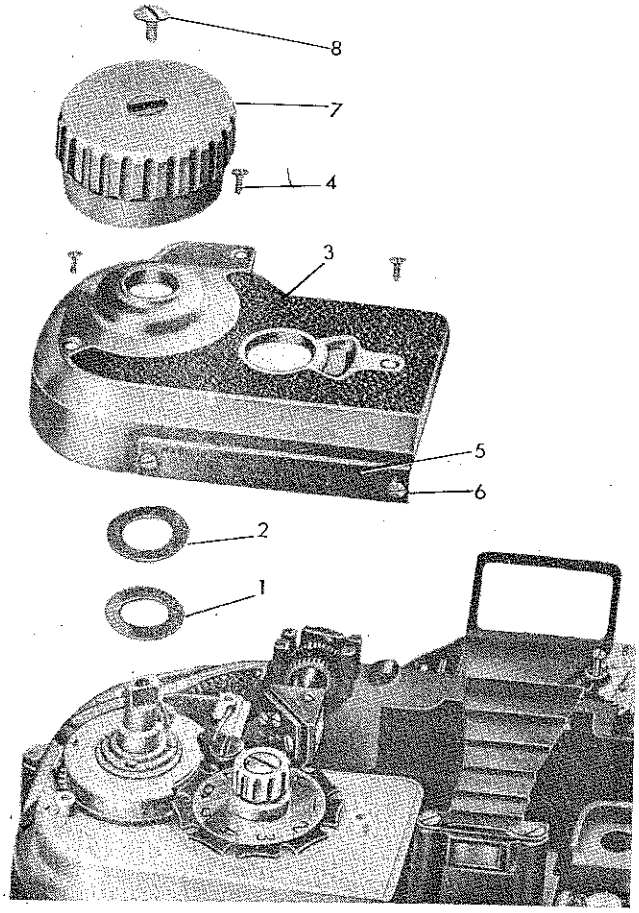


Figure 67—Counter Dial Housing Complete, Exploded from Camera

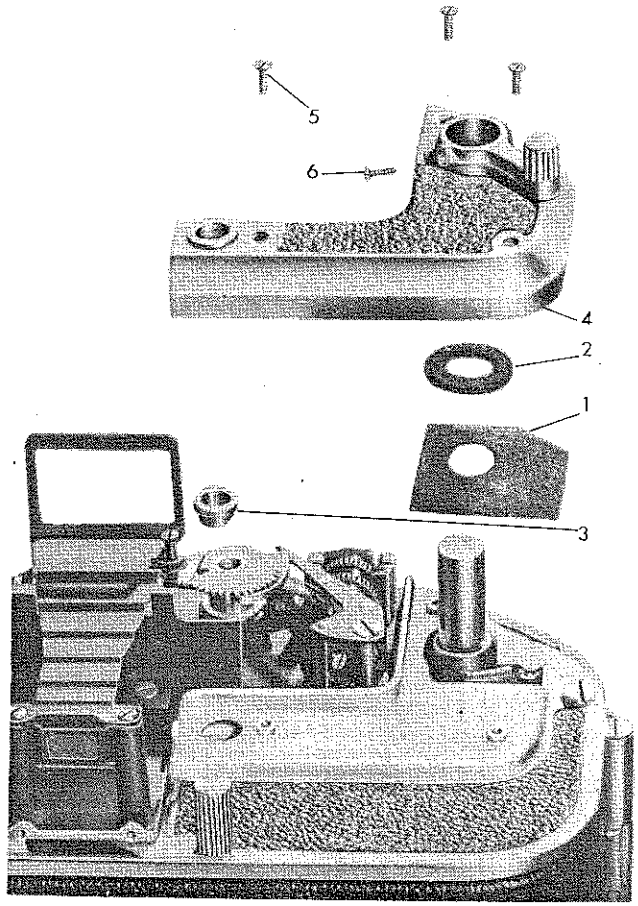


Figure 68—Time Lever Housing Complete, Exploded from Camera

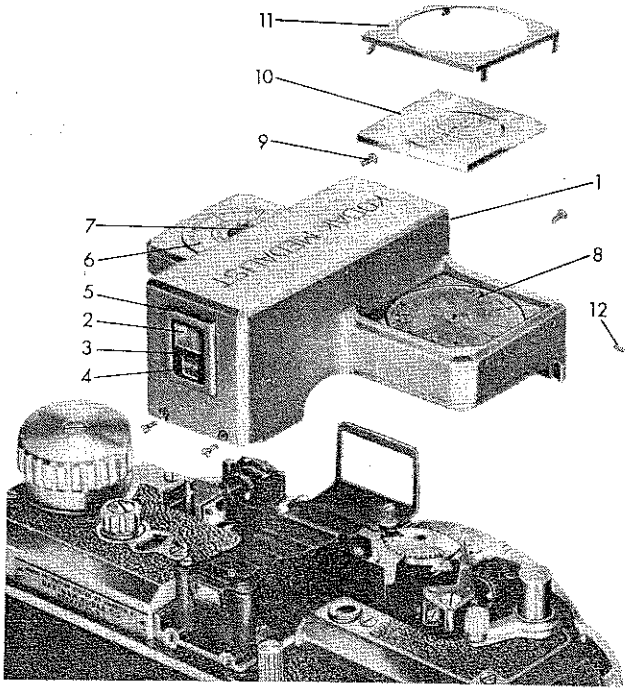


Figure 69—Direct View Finder Cover Assembly, Exploded from Camera

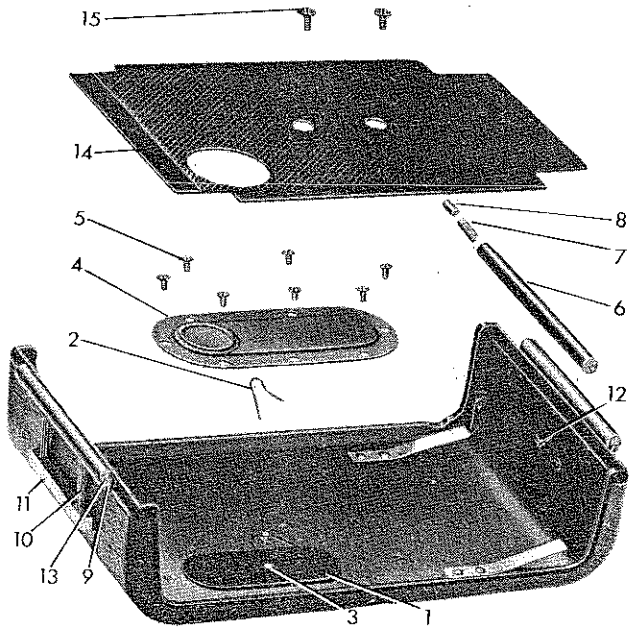


Figure 70—Back Complete, Partially Exploded

GROUP PHOTOGRAPHIC EQUIPMENT

MAJOR ASSEMBLY Kodak Medalist (Type B)

FIG. NO.	INDEX NO.	STOCKED	PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
			*81013				Counter Gear Assembly				1			
			*78921				Gear - Counter				1			
			*78896				Pin - Counter dial				1			
			*78825				Knob - Counter				1			
66	7		78902				Washer - Counter knob				1			
	8		78826				Screw - Counter knob				1			
67	1		92950				Washer - Key post spacing				1AR			
	2		78933				Washer - Key post spring				1			
	3		80996				Counter Dial Housing Complete				1			
			*78822				Housing - Counter dial				1			
			*78932				Covering - Counter dial housing				1			
			*78923				Plate - Counter window				1			
			*78829				Window - Counter (clear)				1			
			*94266				Rivet - Counter window plate to counter dial housing				2			
	4		94678				Screw - Counter dial housing to range finder plate				3			
	5		81789				Plate - Origin				1			
	6		78883				Screw - Origin plate				2			
			*93460				Label - Patent				1			
	7		78789				Knob - Key				1			
	8		86366				Screw - Key knob				1			
68	1		86965				Washer - Trigger bushing leak light				1			
	2		44090				Washer - Trigger button leak light				1			
	3		83953				Tube - Exposure indicator				1			
	4		80997				Time Lever Housing Complete				1			
			*78823				Housing - Time lever				1			
			*78931				Covering - Time lever housing				1			
			*78834				Bezel - Exposure signal				1			
			*78833				Window - Exposure signal				1			
			*78912				Stud - Time lever stop				2			
			*83945				Washer - Time lever				1			
			*78836				Spring - Time lever				1			
			*78835				Lever - Time				1			
	5		94678				Screw - Time lever housing to range finder plate				3			
	6		78837				Screw - Time lever key				1			
69	1		81019				Direct View Finder Cover Assembly				1			
			*78865				Cover - Direct view finder				1			
			65064				Window - Front				2			
			78871				Eyelet - Range finder				2			
			78869				Lens - Negative finder				1			
			78870				Frame - Negative finder lens				1			
			*86708				Guard - Negative lens reflection				1			
	2		78866				Rear Window Assembly				1			
	3		78867				Mask - View finder				1			
	4		96097				Mask - Aligning				1			
			*94267				Shim - Range finder window				1AR			
	5		78868				Frame - View finder eyelet				1			
	6		89276				Indicator - Film				1			
	7		74114				Stud - Film indicator dial				1			
			78875				Pinion - Focus scale				1			
			83946				Spring - Focus scale hair				1			
	8		78874				Scale - Focus				1			
	9		95425				Screw - Direct view finder to range finder plate				4			
	10		78873				Scale - Depth of focus				1			
	11		78872				Frame - Focus scale				1			
	12		66716				Screw - Depth of focus scale frame to cover				2			

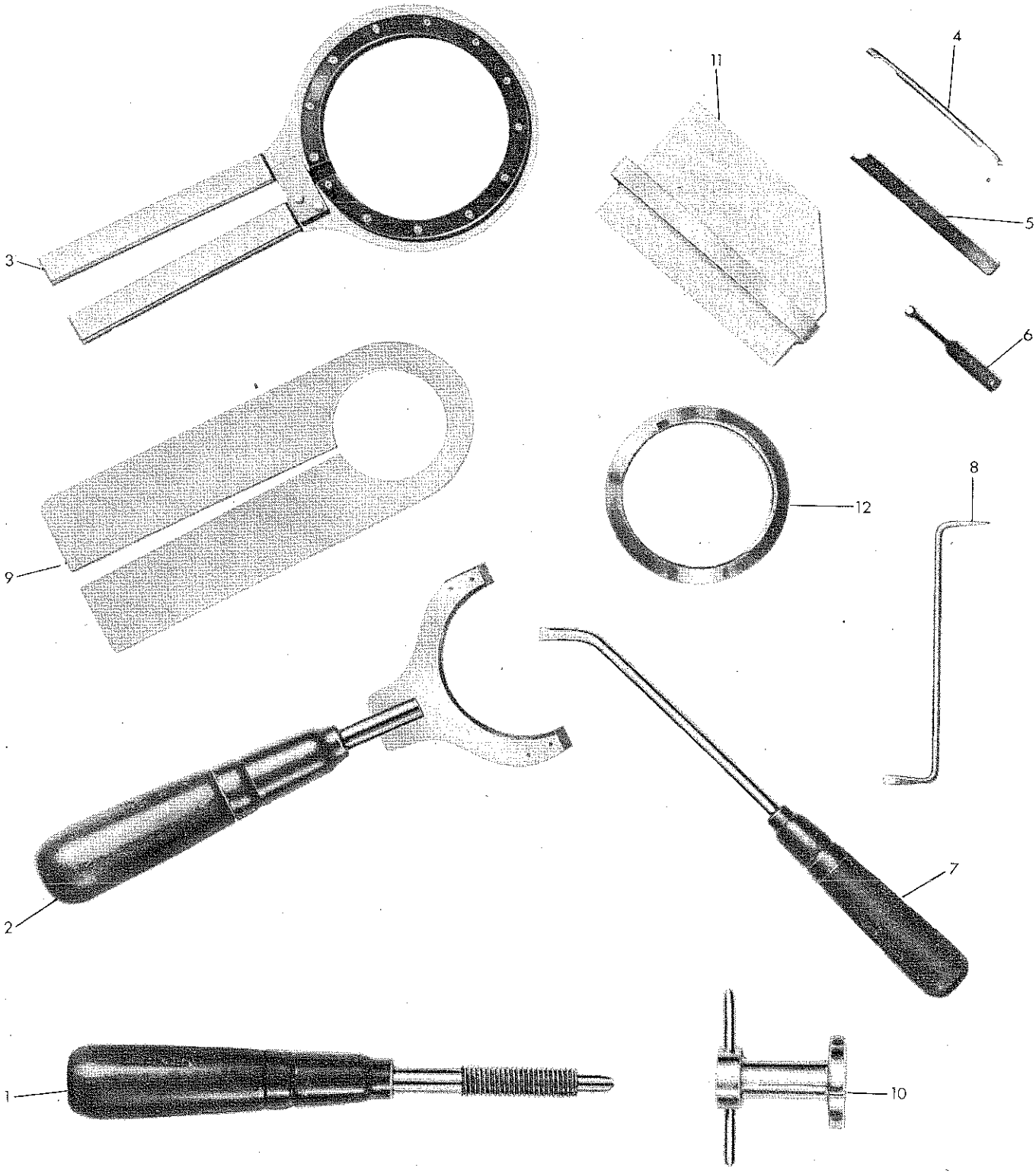
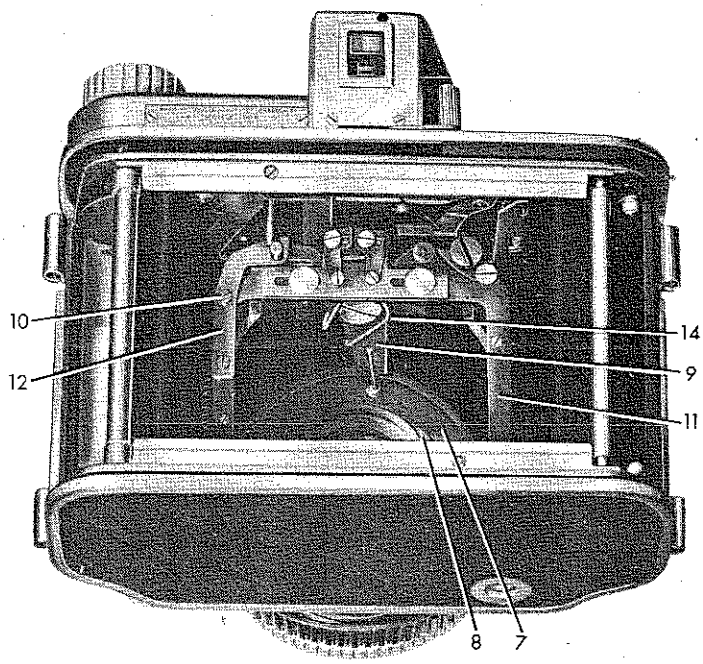


Figure 71—Special Tools

GROUP PHOTOGRAPHIC EQUIPMENT

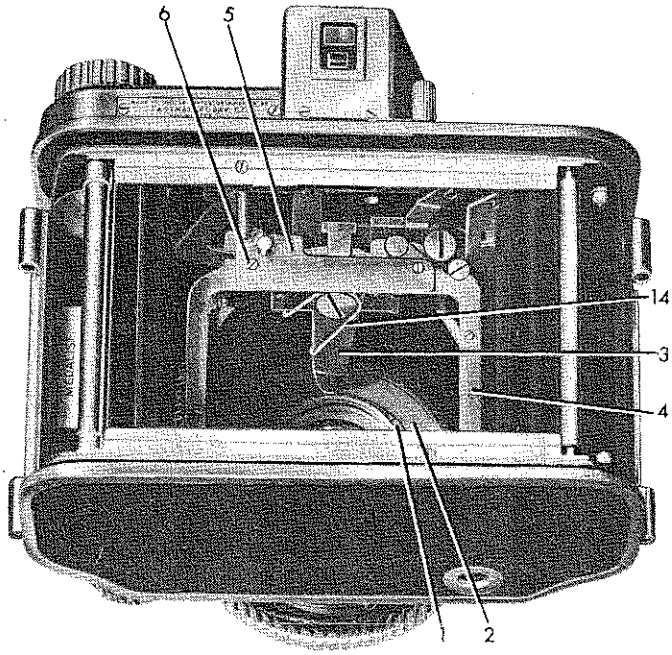
MAJOR ASSEMBLY Kodak Medalist (Type B)

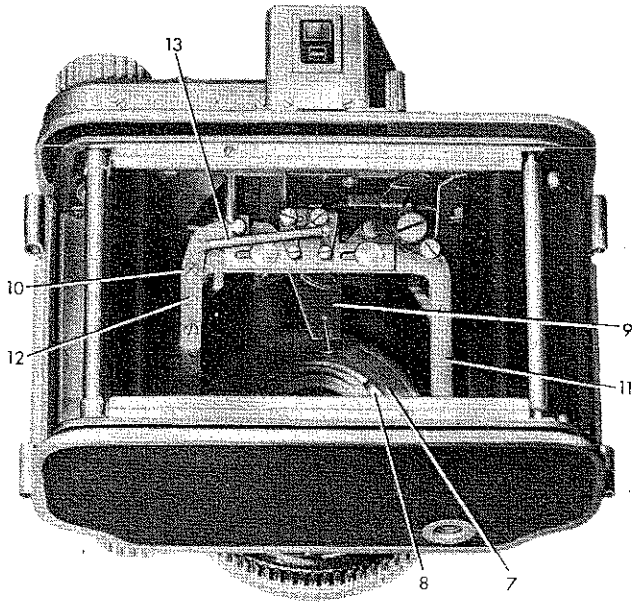
FIG. NO:	INDEX NO.	STOCKED	PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
53	16		88560			Stop - Focusing tube					1			
			80991			Back Covered					1			
			*78876				Back				1			
			*78927				Covering - Case back				1			
			*78895				Spring - Safety gear shaft				2			
			*16263				Rivet				4			
70	1		78888				Slide - Window				1			
			*78893				Stud - Window slide spring				1			
	2		78892				Spring - Window slide				1			
	3		78891				Button - Window slide				1			
	4		98432				Window Slide Cover Assembly				1			
			*1618					Window - Film			1			
			*78890					Cover - Window slide			1			
	5		56570				Screw - Window cover to back				7			
	6		78884				Roller - Back film				1			
	7		78887				Spring - Film roller pin				1			
	8		78886				Pin - Film roller				1			
			*78877				Hinge - Back				2			
	9		78882				Latch - Hinge				2			
			78883				Screw - Hinge to latch				2			
	10		78941				Grip - Hinge				4			
			*53776				Rivet - Back hinge				6			
	11		78881				Guide - Hinge grip				2			
	12		69371				Screw - Hinge grip guide				4			
			66707				Spring - Hinge pin				2			
	13		78878				Pin - Hinge				4			
	14		86586				Film Tension Pad Assembly				1			
			*78894					Pad - Film tension			1			
			*86519					Spring - Tension pad			1			
			*86520					Rivet - Tension pad spring			2			
	15		85052				Screw - Tension pad to back				2			
			87537			Neck Strap Assembly					1			
			*95165				Strap - Neck				1			
			*87536				Backing - Neck strap				1			
			Commercial				Thread (87532) #4 Cord 40 black cotton thread (Rochester Thread Co., Rochester, N. Y.) or equiv.				1			
			Commercial				Thread (87533) #4 Cord 40 white cotton thread (Rochester Thread Co., Rochester, N. Y.) or equiv.				1			
			*80817				Stud - End loop				2			
71	1		84		Handle (for special tool No. 501-U)						1			
	2		501-A		Wrench - Shutter retaining collar						1			
	3		501-B		Wrench - Focusing tube retaining collar						1			
	4		501-C		Screw Driver - Offset						1			
	5		501-D		Wrench						1			
	6		501-E		Wrench						1			
	7		501-I		Tool - Bending						1			
	8		501-L		Screw Driver - Offset						1			
	9		501-O		Clamp						1			
	10		501-U		Tool - Expanding						1			
	11		501-V		Ground glass and spring clamp						1			
	12		501-W		Block - Shutter protector						1			



←TYPE A

TYPE B→





←TYPE C

Figure 72—Camera Types

GROUP PHOTOGRAPHIC EQUIPMENT
MAJOR ASSEMBLY Kodak Medalist (Type A)

FIG. NO.	INDEX NO.	STOCKED	PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
			Add											
			in 94148 — 71485							Screw - Adapter lock	1			
			—*78956							Plate - Speed and diaphragm index	1			
			— 78972							Adapter - Lens	1			
72	1		— 78977R							Nut - Shutter operating disk bearing	1			
	2		— 80916							Shutter Operating Disk Assembly	1			
			— 80922R							Cover Complete	1			
	3		in 80994 — 78755							Lever - Shutter operating	1			
	4		— 81009							Focusing Tube Guide Assembly	1			
	5		in 81024 — 86683							Plate - Focusing tube guide	1			
	6		— 86684							Screw - Focusing tube guide plate to tube	2			
			Delete											
	7		from 94148— 78975							Disk - Shutter operating	1			
	8		— 78977							Nut - Shutter operating disk bearing	1			
			— 80922							Cover Complete	1			
			— 86602							Spring - Diaphragm control ring	2			
			— 87025							Screw - Diaphragm control ring retainer	3			
			— 93298							Screw - Speed index plate anchor stud	2			
			— 95023							Plate - Speed and diaphragm index	1			
	9		from 80994— 87449							Shutter Operating Lever and End Assembly	1			
	10		from 81024— 85052							Screw - Focusing tube guide lug to focusing tube guide	2			
	11		— 88365							Focusing Tube Guide Assembly	1			
	12		— 92559							Focusing Tube Guide Lug Assembly	1			
			— 95749							Screw - Focusing tube guide to focusing tube	2			

FIG. NO.	INDEX NO.	STOCKED	GROUP PHOTOGRAPHIC EQUIPMENT MAJOR ASSEMBLY Kodak Medalist (Type C) PART NUMBER	1	2	3	4	5	6	NOMENCLATURE	UNITS PER ASSY	PROPERTY CLASSIFICATION U.S. NAVY	U.S. ARMY	BRITISH
			Add											
			in 81024 — 66860							Screw - Coincidence prism mount to range finder plate	1			
			—-66860							Screw - Erecting prism mount to range finder plate	1			
			— 94048							Coincidence Prism Assembly Complete	1			
72	13		— 94166							Spring - Guide lug	1			
			— 94752							Erecting Prism Assembly Complete	1			
			— 95425							Screw - Erecting prism mount to range finder plate	1			
			Delete											
	14		from 80994— 78754							Spring - Shutter operating lever	1			
			from 81024— 81005							Erecting and Coincidence Prism Assembly	1			

SECTION IX—NUMERICAL PARTS LIST

PART NUMBER	GROUP LIST PAGE NUMBERS	TOTAL QUANTITY
HE25466	67	
11189	61	1
16167	55	1
1618	73	1
16263	73	4
21635	67	3
25913	55	1
31463	53	3
33304	57	1
35625	65	2
36722	55	1
40553	53	3
44090	71	1
44403	57	2
48368	53	2
501-A	73	1
501-B	73	1
501-C	73	1
501-D	73	1
501-E	73	1
501-I	73	1
501-L	73	1
501-O	73	1
501-U	73	1
501-V	73	1
501-W	73	1
53776	73	6
55321	63	5
56570	73	7
56790	69	1
56847	63	1
56848	59	1
56850	63	1
56851	59	1
56853	59	1
56854	61	3
56855	61	1
56857	59	1
56858	63	1
56865	63	1
56875	59	1
56878	61	1
56880	59	2
56884	63	1
56885	61	1
56886	59	1
56887	61	1
56888	61	1
56890	59	1
56891	63	1
56906	61	1
56911	63	1
56912	65	1
56913	63	1
56914	65	1
56915	63	1
56916	63	2
56922	59	1
56924	61	1
57237	68	2
59044	69	1
60212	57,68,69	10
60816	63	5
60820	65	1
60822	63	1
60829	63	1
60831	57	1
60832	59	1
60833	63	1
61189	65	2
61201	53,57	4
61812	53	3
61826	63	1
6247	67	3
62720	63	1
62804	62	2
62888	68	2
63894	53	2
63916	61	1
64784	61	1
64786	62	1
64788	59	1
64789	61	1
64795	59	1
64798	62	1
64799	61	1
64802	59	2
65064	71	2
65153	69	2
66163	63	1
66168	62	1
66172	61	1
66173	63	1
66180	63	1
66601	57	2
66707	73	2
66716	69,71	6
66860	69	2
66892	68	2
67759	63	1
67761	63	1
67762	63	1
67763	61	1
67764	63	1
67765	63	2
67766	63	2
67769	59	5
68608	61	1
68609	61	1
68610	61	1
68617	62	1
68618	59	1
68619	61	1
68627	61	1
68643	63	1
68644	62	1
68647	65	1
68651	63	1
69083	69	1
69371	73	4
71474	57	1
73426	63	3
73432	63	1
73877	65	1
73878	65	1
74098	57	2
74114	71	1
74480	61	1
75431	65	2
75907	63	2
77261	69	1
77341	61	1
78731	53	1
78732	53	1
78733	53	1
78734	53	1
78735	53	1
78736	53	1
78737	57	1
78738	53	1
78740	53	1
78741	53	1
78742	53	1
78743	53	1
78744	53	1
78745	57	1
78746	57	1
78747	57	1
78748	57	1
78749	67	1
78750	67	4
78751	67	1
78752	67	1
78753	57	1
78754	57	1
78758	57	1
78759	53	4
78760	53	1
78761	53	1
78762	53	1
78763	53	4
78764	53	1
78768	53	1
78769	53	1
78771	53	1
78772	53	1
78773	53	2
78774	53	2
78775	68	1
78776	67	1
78777	67	1
78778	67	1
78779	68	2
78780	67	1
78781	68	1
78782	67	1
78783	57	1
78784	57	1
78785	53	1
78786	67	1
78787	67	1
78788	68	1
78789	71	1
78790	55	1
78791	55	1
78792	55	1
78793	55	1
78794	55	1
78795	53	1

PART NUMBER	GROUP LIST PAGE NUMBERS	TOTAL QUANTITY	PART NUMBER	GROUP LIST PAGE NUMBERS	TOTAL QUANTITY	PART NUMBER	GROUP LIST PAGE NUMBERS	TOTAL QUANTITY
78797	55	1	78870	71	1	78944	69	1
78799	55	1	78871	71	2	78945	57	1
78800	53,55	2	78872	71	1	78951	65	1
78801	53	1	78873	71	1	78952	65	1
78802	55	1	78874	71	1	78953	57	1
78803	55	1	78875	71	1	78954	65	1
78804	55	1	78876	73	1	78958	65	1
78805	68	1	78877	73	2	78959	63	1
78806	68	1	78878	73	4	78960	59	1
78807	68	1	78881	73	2	78961	57	1
78808	53	1	78882	73	2	78963	63	1
78811	55	1	78883	71,73	4	78964	65	1
78812	53	1	78884	73	1	78965	63	1
78813	55	1	78886	73	1	78966	63	1
78814	55	1	78887	73	1	78967	63	2
78815	57	1	78888	73	1	78969	67	1
78816	57	1	78890	73	1	78970	63	1
78817	55	1	78891	73	1	78971	65	1
78818	57,67	2	78892	73	1	78974	65	1
78819	55	1	78893	73	1	78975	65	1
78820	68	1	78894	73	1	78976	65	1
78822	71	1	78895	73	2	78977	67	1
78823	71	1	78896	71	1	78979	63	1
78825	71	1	78897	68	1	78980	65	2
78826	71	1	78898	57	1	78981	59	1
78827	69	1	78900	68	1	78982	65	2
78828	69	1	78901	53	4	79021	61	1
78829	71	1	78902	71	1	79878	63	1
78830	69	1	78903	55	1	80500	65	1
78831	69	1	78904	57	1	80817	73	2
78832	69	1	78905	53	1	80915	57	1
78833	71	1	78906	55	1	80917	65	1
78834	71	1	78907	55	1	80918	63	1
78835	71	1	78908	68	1	80919	59	1
78836	71	1	78909	68	1	80920	59	1
78837	71	1	78910	55	1	80921	59	1
78840	69	2	78911	68	1	80922	63	1
78843	69	2	78912	71	2	80923	59	1
78844	68	1	78913	57,68	4	80924	57	1
78845	68	1	78914	55	1	80991	73	1
78846	68	1	78915	68	1	80992	53	1
78847	68	1	78916	55	1	80993	53	1
78849	68	1	78919	68	1	80994	53	1
78850	68	1	78921	71	1	80995	55	1
78851	68	1	78923	71	1	80996	71	1
78852	68	1	78924	53	1	80997	71	1
78853	68	1	78925	53	1	80998	68	1
78854	69	1	78926	53	1	80999	68	1
78855	69	1	78927	73	1	81000	69	2
78856	69	1	78928	53	1	81001	69	1
78857	69	1	78929	68	1	81002	69	1
78858	69	1	78930	68	1	81003	69	1
78859	69	1	78931	71	1	81005	69	1
78860	69	1	78932	71	1	81006	68	1
78862	69	1	78933	71	1	81007	68	1
78863	69	1	78934	67	1	81008	69	1
78864	69	1	78936	57	1	81011	55	1
78865	71	1	78937	57	1	81012	55	1
78866	71	1	78938	68	1	81013	71	1
78867	71	1	78939	57	2	81014	68	1
78868	71	1	78941	73	4	81015	67	1
78869	71	1	78943	68,69	2	81016	67	1

PART NUMBER	GROUP LIST PAGE NUMBERS	TOTAL QUANTITY	PART NUMBER	GROUP LIST PAGE NUMBERS	TOTAL QUANTITY	PART NUMBER	GROUP LIST PAGE NUMBERS	TOTAL QUANTITY
81017	67	1	85676	69	1	90888	67	2
81018	55	1	85718	68	1	92559	67	1
81019	71	1	86366	57,71	2	92662	63	1
81020	55	1	86519	73	1	92950	71	1AR
81021	53	1	86520	73	2	93073	65	1
81022	53	1	86586	73	1	93253	68	1
81023	53	1	86602	65	2	93291	67	1
81024	53	1	86615	53	1	93292	67	1
81025	53	1	86708	71	1	93298	65	2
81789	71	1	86794	68	1	93436	53	8
82359	55	1	86890	53	2	93460	71	1
82360	67	1	86891	53	2	93713	59	1
82361	67	1	86965	71	1	94058	69	2
82362	68	1	87024	63	2	94148	57	1
82364	67	1	87025	65	3	94149	57	1
82365	55	1	87027	62,63	4	94165	67	1
82366	55	1	87031	57	1	94266	71	2
82367	55	1	87110	57	4	94267	71	1AR
82368	67	1	87170	65	1	94678	71	6
82369	55	1	87171	65	2	94757	63	1
82370	55	1	87256	62	2	94758	62	1
82371	55	1	87440	57	1	94759	62	1
82372	67	1	87441	57	1	94760	62	1
82989	65	1	87443	67	1	94761	62	1
83470	61,62	4	87445	67	2	94762	62	1
83471	62	2	87446	67	1	94763	62	1
83834	57	1	87447	57	1	94764	62	1
83945	71	1	87449	57	1	95023	65	1
83946	71	1	87536	73	1	95024	65	1
83952	69	1	87537	73	1	95165	73	1
83953	71	1	87718	67,68	3	95377	63	1
84	73	1	87874	53	1	95378	62	1
84321	69	1	88118	67	1	95379	62	1
84322	69	1	88364	57	1	95380	62	1
84323	55	1	88365	67	1	95381	62	1
84324	57	1	88560	73	1	95425	71	4
84995	69	1	88743	53	1	95749	67	2
85052	67,73	6	88958	67	1	96097	71	1
85053	69	4	88959	55	1	96810	53	4
85058	57	1	89276	71	1	97271	57	1
85673	55	1	90873	62	1	98432	73	1